FLIGHT
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DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list—

1928

Sept. 29 .... Northampton Air Pageant
Oct. 7–28 International Aircraft Exhibition, Berlin
Oct. 8 .... Aero Golfing Soc.—Team Match v. Stage G.C.
Oct. 24 .... Aero Golfing Soc.—"Cellon" Challenge Cup
Dec. 3–8 .... International Aeronautical Exhibition, Chicago, Ill.
Dec. 12–14 International Conference on Aviation, Washington, U.S.A.

1929

Oct. 31 .... Guggenheim Safe-Aircraft Competition Closes

EDITORIAL COMMENT

FOR the second time in the history of the company, Imperial Airways, Limited has succeeded in running at a profit, and has declared a dividend of 5 per cent., less tax, on the ordinary shares. The balance sheet shows a profit of no less than £72,567, as compared with £11,461 the previous year, a net increase of £61,106. It is, of course, quite obvious that this fact does not necessarily prove that aviation is now able to "fly by itself." Actually, it is fairly certain that without the Government subsidy the company would have incurred a heavy loss, but the figures do at least indicate that possibly we are getting a little nearer to the day when a private company can operate at a profit without subsidy from the Government. We say possibly because, without knowing the details of the application of the subsidy, it is impossible to estimate whether the increased profits were due to more economical operation resulting from a greater amount of traffic, or to the earning of a greater subsidy, or to a combination of the two. Most likely the latter was responsible, but without figures one is not in a position to judge.

Commercial Aviation

The report of the directors of Imperial Airways, Limited states that of the sum of £72,567 odd, a sum of £24,171 has been appropriated to extinguish the debit on last year's profit and loss account; a sum of £20,663 has been written off, being one-half of the preliminary expenses and underwriting commission, and the sum of £23,682 is the payment of dividend, at the rate of 5 per cent. on ordinary shares. This leaves a sum of £4,049 to be carried forward to the next account. As far as the directors' report is concerned, these are the essential figures. At the ordinary meeting of the company on September 7 the chairman, Sir Eric Geddes, presided and explained at considerable length the accounts, etc., while at the extraordinary general meeting that followed, he explained the new proposed agreement with the Government.

At the first meeting, Sir Eric explained that, on the asset side, the value of aircraft in the possession

of the company was £250,000. According to the directors' report, the company has in service 15 machines of high power, and three smaller types used on special charters, etc., while there are four three-engined types under construction. A total fleet of 22 machines is not a very impressive "stable," but it is to be presumed that these have been kept fairly busy, which is to be preferred to a larger number of machines either flying with half-load or standing idle.

On the subject of the profit and loss account, Sir Eric Geddes made several very interesting observations. For example, the credit balance brought forward from the trading account was £132,000 as compared with £54,000 last year, and Sir Eric pointed out that this satisfactory improvement represented great progress because it meant that the gross profit showed continuous improvement. This was a hopeful sign for the future, because it meant that the existing fleet could cater for additional traffic without any subsidy. "In fact," Sir Eric said, "during the year under review, your company carried out nearly 33 per cent. more unsubsidised flights than in the previous year." A closer indication of the nature of these flights would have been interesting.

Turning to the subject of operation, Sir Eric said that two years ago it was estimated that the rate of traffic increase on the European routes would be in the region of 10 per cent. per annum. He was glad to say that the traffic on the European services was now 60 per cent. higher than it was two years ago. The "Silver Wing" de luxe service, on which the pay load was reduced in order to enable the machines to carry a steward and a small buffet, had been found to attract increased traffic.

At the extraordinary general meeting, Sir Eric Geddes outlined, briefly, the past history of the company, and then turned to the subject of the new agreement with the Government. This, he said, had as one of its main features the establishment, first, of a weekly service between England and India, and later, as traffic developed, a bi-weekly service. The agreement also provided for a more rapid obsolescence rate, and the financial provision allowed for the replacement of machines on the main routes to be made every four years. This did not mean that aircraft so replaced would be scrapped, but could be employed for new lines on unsubsidised flights free of the burden of obsolescence and insurance.

Another provision of the new agreement was the transfer to the company of two large three-engined all-metal flying-boats (Short "Calcuttas"). They had been unable, hitherto, to develop the marine side of civil aviation, but this year notable strides had been made, and he thought that in the near future they would be prepared to tackle the long overseas flights which would take them from Singapore to Australia. Those who had hoped to be supplied with details of the proposed new agreement with the Government were disappointed. Sir Eric said that in the past details had been published, but it had been found that this was detrimental to the interests of the company, and he therefore hoped that—solely in the interests of the shareholders—they would not press him to answer questions concerning the operational details of the agreement.

As chairman of a commercial undertaking, doubtless Sir Eric was quite in order, but on the other hand, Imperial Airways, Ltd., is a subsidised company and maintained primarily with Imperial interests in view. That being the case, surely the nation is entitled to know in what manner it is proposed to spend a subsidy which amounts to £335,000 per annum for the first two years, £310,000 per annum for the next four years, £220,000 for the seventh year, £170,000 for the eighth year, £120,000 for the ninth year, and £70,000 for the tenth and last year, a total of almost 2½ million pounds.

The development of Empire routes was touched upon in the most general terms only by Sir Eric. After explaining that the longer the route the more speed would tell in comparison with sea and rail transport, Sir Eric stated that on the England-India route they intended to start with a weekly service because that was all for which they could get traffic, and was the minimum service with which they could hope to develop traffic. On a weekly service like that over a long Empire route the waiting time of the machines at each stage was so much waste; but the moment sufficient traffic was offering they could duplicate the service with practically no increase in capital expenditure. On the Empire route, Sir Eric said, they would fly the Mediterranean with the newest type of seaplane. If these marine aircraft were as successful as they had reason to hope, they foresaw, clear of many of the diplomatic and international difficulties which hampered them to-day, a vast extension of flying by marine aircraft to many outlying parts of the Empire. It is gratifying to find that Sir Eric and his co-directors are at last beginning to realise the value of the seaplane. Hitherto Imperial Airways Ltd., has not shown very much initiative in this direction.

In the development of Empire routes Sir Eric saw the future for the company. There would be another future for feeder lines, &c., but he thought the company should run the main trunk lines, helping with advice and experience newcomers to work the feeder lines. To be economic, however, the main trunk routes must be in one hand. The reasons for that contention were made fairly clear by this passage in Sir Eric Geddes' speech:—

"This agreement," Sir Eric said, "which we commend to you for your ratification, is the fruit of our minds working purely on the lines of successful commercial development. From that point of view—and I concern myself in this room with no other point of view—the Government is following a right and proper course; but, of course, no one is ever contented with what a Government does, and therefore I am thoroughly discontented with the paucity of the assistance. I would like the Government to have said: 'We give you this agreement now; we will shortly enter into a further agreement with you to go to the Cape or to Singapore; and then a further agreement to go to Australia. We will settle with other Empire Governments what their share is to be.' They have not said so, and 'Not one penny more' has been their cry. 'Go get other subsidies if you can' has been their refrain; but I am sure that, once this route is organised, in the next year or two extensions, and further assistance in the early years of the new sections will be forthcoming."

◇ ◈

High Speed Flight Formed

THE chosen officers for the "High Speed Flight" of the R.A.F. are Flight-Lieut. D'Arcy Greig (in command), Flying-Officer C. S. Staniland, and Flight-Lieut. G. H. Stainforth.

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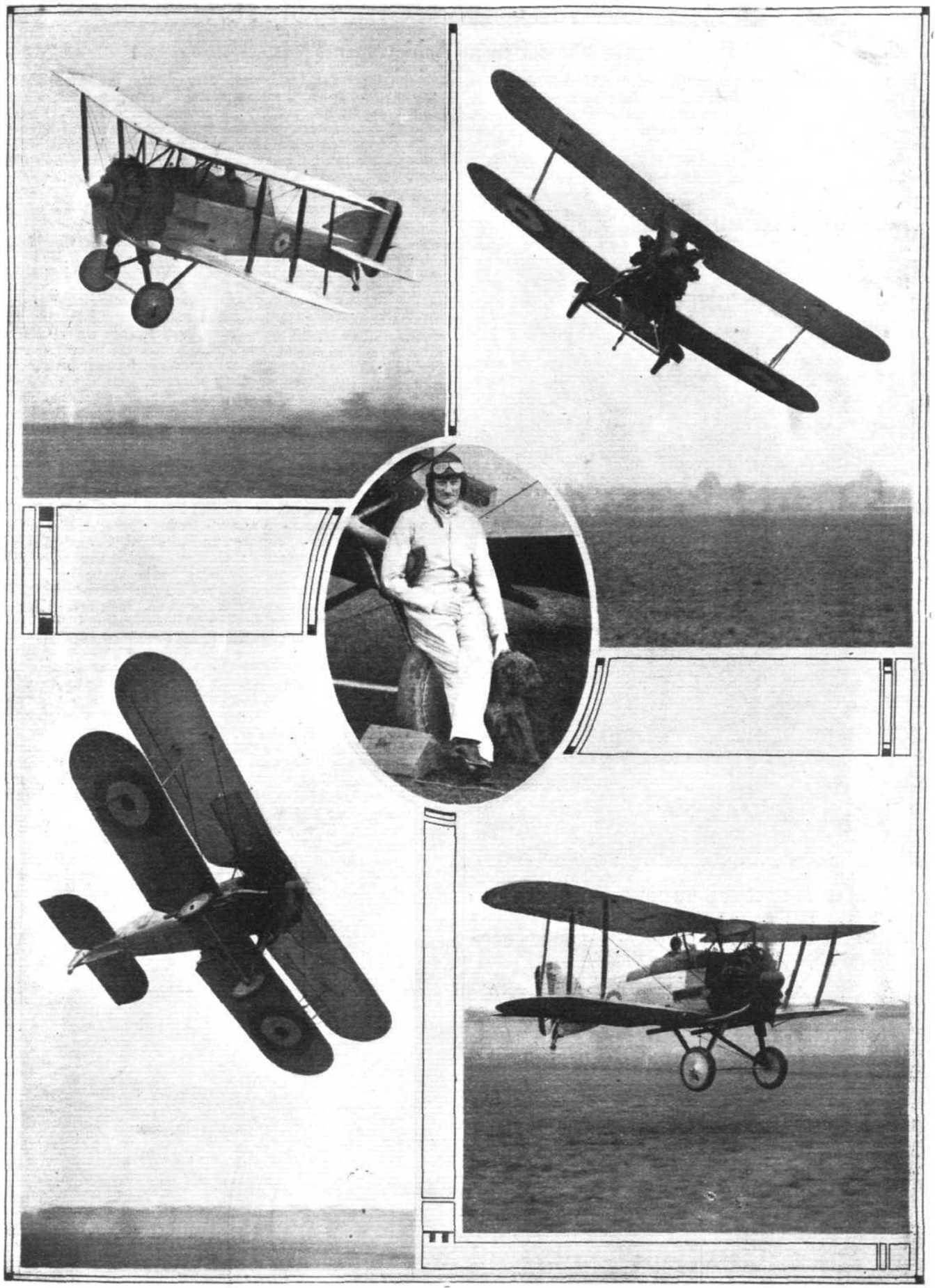
Flying-Officer T. H. Moon, who was technical officer in the last Schneider Trophy Team, will probably retain that position, for this new Flight will fly the British machines in the next Schneider Trophy Race.



["FLIGHT" *Photographs*

THE "GLOSTER GAMECOCK II," Bristol "Jupiter" engine, in various attitudes of flight. The pilot on this occasion, some little time ago, was Flying Officer Howard J. T. Saint, D.S.C., chief test pilot to the Gloster Aircraft Company. He is seen in the inset.

THE GEARED BRISTOL "JUPITER"

Some Recent Achievements

JUST recently the geared-type Bristol "Jupiter" air-cooled radial aero engine—a brief reference to which was made in our issue of May 24 last—has achieved noteworthy successes. One of these, accomplished at home, was a 150 hours' test under actual flying conditions.

In accordance with the Bristol company's usual policy of submitting new types of engines to extended flight tests, they recently completed tests covering 150 hours' flying on the new type "Jupiter" Series VIII geared engine. One of these engines was fitted in a Bristol "Bloodhound" biplane, and the tests were carried out mainly with the idea of proving out the most suitable compression ratio for a high compression geared air-cooled engine, and also of proving out a suitable exhaust system for such an engine.

THE GEARED BRISTOL "JUPITER" AT HOME: The Series VIII geared engine which, installed in a Bristol "Bloodhound" biplane, successfully accomplished a 150-hrs.' flying test

As a result of these tests, which were most successful, a compression ratio of 5-8 was selected. Considerable development work was found to be necessary in regard to the exhaust ring, owing to the fact that with the 2 : 1 reduction gear the cooling slip stream was not as efficient as with the ungeared engine. Accordingly the area of the exhaust ring and outlet pipes had to be considerably increased and modified as compared with the ungeared engine, in order to meet the official requirements of the Fire Prevention Committee. As a result the exhaust ring area has been increased to 24·5 sq. in., and double outlet pipes provided for each cylinder.

It is interesting to note that with the "Bloodhound" machine considerable increase in performance was registered with the geared engine as compared with the ungeared type. For instance, at 5,000 ft. the increase in speed was over 12 m.p.h., or approximately 10 per cent.

The other success with the geared "Jupiter" was achieved abroad, in connection with the recent flying competition of the Petite-Entente. This was a competition for two-seater reconnaissance or day bombing machines adopted by the military air services of Jugo-Slavia, Roumania, Czecho-Slovakia and Poland.

This competition was divided into two tests. The first was a speed test over a circuit of 3,112 kms., embracing Praha-Prostejow - Krakow - Warsaw - Lwow - Jassy - Bucharest - Belgrad - Zagreb - Brono - Praha, whilst the second test consisted of a climb to 5,000 metres, carrying the same useful load which was transported during the speed test.

The mixed Commission of the Petite-Entente controlled the meeting and checked times, both on the speed and climb test, and adjustments were then made according to the useful load carried. Of 22 machines which started in this event, 20 were equipped with water-cooled motors and one only was equipped with the "Jupiter" geared air-cooled engine.

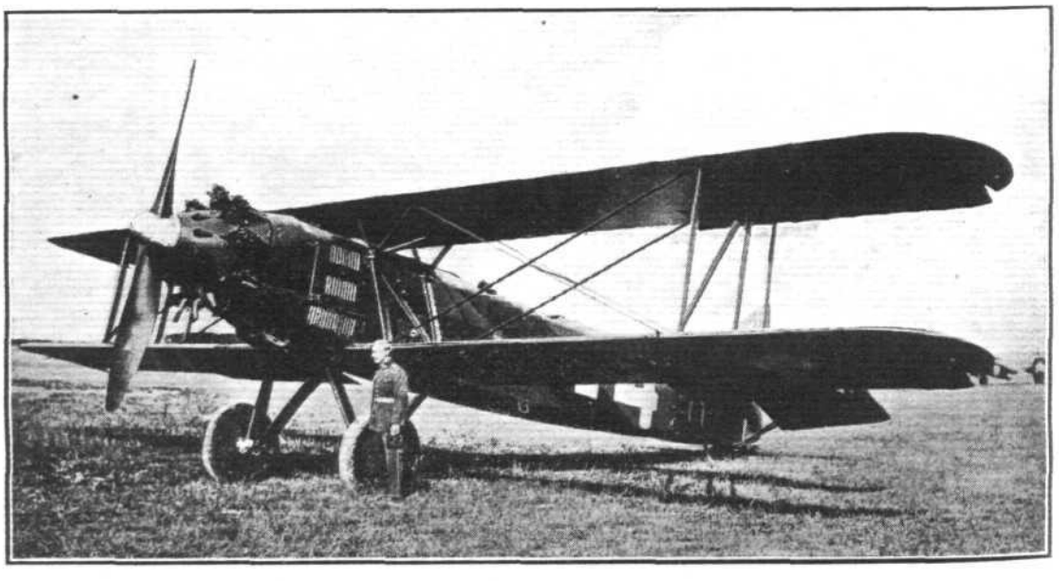
Only 11 machines completed the test, the first prize being awarded to the Czecho-Slovak "Smolik" S.16 machine fitted with a "Jupiter" geared engine and flown by Commandant Kalla and Mechanic Tauffer.

This machine gained 6,962 points as compared with a total of 5,928 points awarded to the second machine. It should also be noted that the "Smolik-Jupiter" machine carried the highest useful load, namely, 1,000 kg. With this load the speed over the circuit of 3,000 km. was more than 200 km./hr. The second machine, carrying a load of 750 kg., averaged 186 km./hr.

In the eliminating speed trials which were held, the "Smolik-Jupiter" machine, carrying a load of 1,000 kgs., showed a speed of 232 km./hr.

The fact that the "Jupiter"-engined machine which gained the laurels in this event obtained over 1,000 points more than its nearest rival created a very favourable impression throughout Central Europe.

The Geared Bristol "Jupiter" Abroad: The Czecho-Slovak "Smolik" S.16 biplane which, fitted with a geared "Jupiter," obtained the first prize in the Petite-Entente competition for reconnaissance or day bombing machines adopted by the air services of Jugo-Slavia, Roumania, Czecho-Slovakia and Poland.



FLIGHT

ORLY LIGHT 'PLANE MEETING

Reliability Tour and Final Positions

GERMANY won the French Light Aeroplane Trials which were started at Orly on September 10, and concluded on September 21 with a reliability trial round France. It was not altogether unexpected because the competitor concerned, Herr R. Lusser, began the final event on September 14 with 110 points ahead of the nearest competitor, Capt. H. Broad. There were six machines in the final event out of the original fourteen. The concluding positions were as follows :—

Competitor.	Machine.	Points.
Herr R. Lusser ..	Klemm (Salmson 40 h.p.) ..	1,691
Capt. E. W. Percival	Avro "Avian" (Cirrus Mk. III)	1,606
Capt. H. Broad ..	"Gipsy-Moth"	1,581
Lady Heath ..	Avro "Avian" (Cirrus Mk. III)	1,520

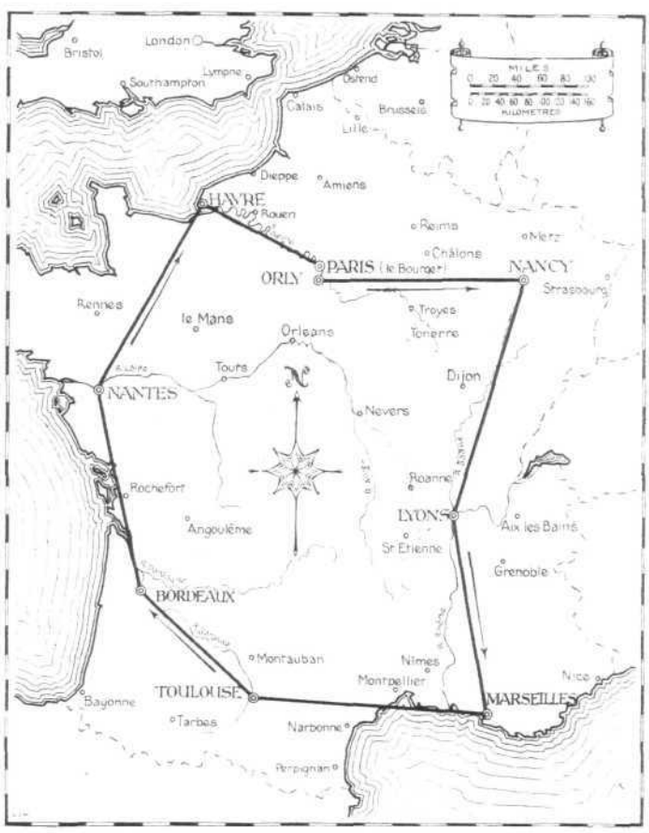
Thus England won three places. The French competitors were placed after. The contest between Herr R. Lusser and Capt. H. Broad became very exciting when the former lost 60 points for failing to fly the Marseilles-Toulouse stage in one day owing to fuel trouble, for that brought Broad within 50 points. Then, unluckily, the latter got his only forced landing and was unable to fly the final lap, Le Havre-Le Bourget, for which he lost 60 points. It was, one believes, his only trouble during the entire meeting.

Capt. Percival, on the Avro "Avian" (Cirrus), must be congratulated on his steady, persevering plodding throughout the contest, bringing him second place and only 85 points behind Herr Lusser. He had won second place in the quality test, second place in the climb test, and third place in the efficiency test. It was the efficiency test that pulled Herr Lusser to his commanding position, for he won for that alone 1,077 points. In the climb he was down to fifth position, and seventh position in the quality test.

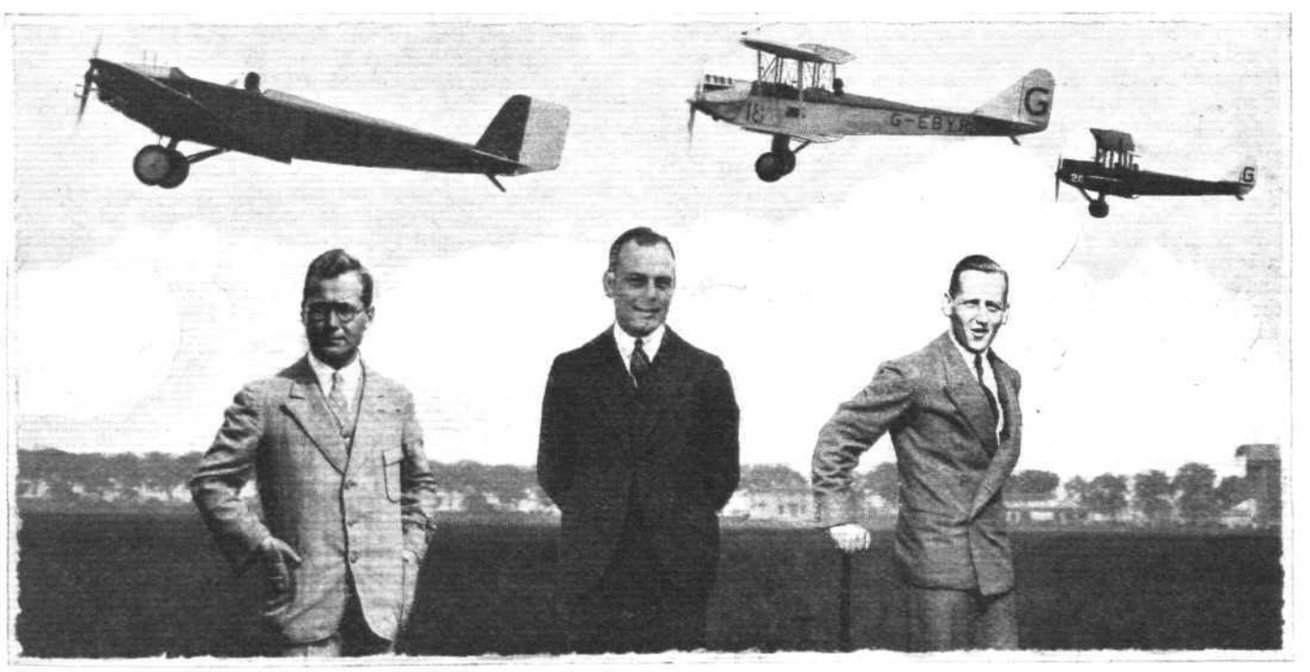
Lady Heath started with great promise, being top of the quality test, but then she became third in the climb and fourth in the efficiency test, and this position she maintained to the end.

M. Fisbach was the only French competitor who did not stay the course amongst those who started on the reliability tour. M. Lemerre, the pilot conspicuous for his head gear, the straw hat, flew his cabin monoplane, the Guerchais-Henriot (Anzani), round safely and lost his straw hat to Lady Heath at the finish. M. Finat, who went through the Orly events on a Caudron monoplane (Salmson), was obliged to hand his machine to Capt. Rouyé for the tour as urgent test work was demanded of him.

We are indebted to Lady Heath for some notes on the experience of the pilots round France. We understand that Herr Lusser, who is a director of the Klemm Company in Germany, was very popular with the French at the various stopping centres. On the stage from Lyon to Marseilles, the Avro "Avians" landed at Dijon to let the D.H. "Moth" of Lady



Our map traces the course round France followed by the competitors in the Reliability Trial which was the concluding event in the French Light 'Plane Trials for 1928. The total distance was 2,166 kms. (1,345 miles).



["FLIGHT" *Photographs*

SUCCESSFUL COMPETITORS IN THE 1928 ORLY MEETING : Herr R. Lusser (left) won with 1,691 points on the Klemm (Salmson) machine shown above him. Capt. E. W. Percival (centre) was second with 1,606 points on the Avro "Avian" (Cirrus Mk. III) (above) ; and Capt. H. Broad (right) third with 1,581 points on the Gipsy-Moth (above).

RELIABILITY TRIAL : These are pictures of events during Lady Heath's forced landing on the beach at Trouville in the Avro "Avian." The landing cost her 60 points, for she did not reach Le Havre until the next day.

Heath's, flown by Mr. Tapper with spares in case of accidents, refuel. Conditions were misty but a following wind gave the English machines a speed of 120 m.p.h. Marseilles aerodrome is 16 miles from the town, and is a seaplane base as well. When the Guerchais monoplane arrived its wheels were turning in. The next stage from Marseilles to Toulouse, 200 miles, was only flown non-stop by Capt. Broad. The others put down at Montpellier for fuel. A big banquet was given the competitors at Toulouse. Herr Lusser made his forced landing as mentioned, but arrived safely the following morning. He had spent the night at Carcassone, which he left at 6 a.m. to reach Toulouse in time to start on the lap to Bordeaux at 8.31 a.m.

The order of departure from Toulouse was Lemerre, Lusser, Rouyé, Lady Heath, Percival and Broad, and they reached Bordeaux, 218 kms. as follows :—Broad, Lemerre, Rouyé, Lusser, Percival and Lady Heath.

It will be remembered that competitors, to comply with the conditions of this trial round France, had merely to cover each stage between the hours of 8 a.m. and 4 p.m., for which 60 points were awarded each. Landings were allowed between stages. Failure to complete a stage within the specified day meant the loss of 60 points, but the trial could still be continued and points earned for other completed stages.

After Bordeaux came Nantes, 292 kms. The pilots arrived in the following order : M. Lusser, Capt. Rouye, M. Lemerre, Lady Heath, Capt. Percival and Capt. Broad, and they were given a reception in the Town Hall by the Lord Mayor and the Aero Club of the Atlantic. The following morning Capt. Broad got away at 8 a.m., and being the first to arrive at Le Havre, 278 kms., he won a prize of 2,000 francs given by the town and the Aero Club. It was awarded him at a big dinner and reception that night.

Capt. Percival was second, taking an hour less for the stage than the Klemm or Caudron. Lady Heath started with him, but after one and a half hours' flying she discovered that the petrol was getting low. Owing to a slight crack the carburetter had been changed the night before, and she concluded that there had been no time to adjust it. She swerved towards Caen and landed in a large field, fortunately near a garage. There was hardly any petrol left in the tank.

On her resuming, Deauville and Trouville were passed and the crossing of the mouth of the Seine begun. A forced landing was then made on the beach at Trouville. To their chagrin, the D.H. "Moth" with spares passed over without seeing them, but it returned an hour later from Le Havre piloted by Capt. Percival and landed on the beach. The eventual arrival at Le Havre following repairs was 17 hours' late, and the 60 points were consequently lost. All the other pilots had gone on for the final lap to Le Bourget except Capt. Broad whose oil pump had ceased to function, due, he thought, to cold thick oil. He started off early but was obliged to return. Only Capt. Rouyé on the Caudron (Salmson) and Capt. Percival on the Avro "Avian" (Cirrus) got through the tour without hitch.

The official prizes offered for this competition totalled 150,000 francs, and will be distributed as follows : 1st, 80,000 francs ; 2nd, 50,000 francs ; and 3rd, 20,000 francs.

After the general arrival at Le Bourget, the pilots had an interesting time flying each others' machines.

It is interesting to know that since January, 1927, about 130 Klemm monoplanes have been produced in Germany. Some have been sold in Africa, whilst production is to take place in America. In the month of August, 32 were sold, and recent production rate has been at the rate of 15 to 20 per month, and selling rate one per day. The company has had to progress in face of considerable doubt of the need for very low-powered light aeroplanes.

Sultan Over London

THE Sultan of Muscat flew over London on September 20 in an Imperial Airways liner accompanied by members of his suite and Sir Sefton Brancker. The pilot was Capt. F. Dinsmore.

The R.A.F. Flying Boat Far East Cruise

SIR SAMUEL HOARE, Secretary of State for Air, has sent the following telegram to Group Captain H.M. Cave-Browne-Cave, D.S.O., D.F.C., Commanding Officer, Far East Flight, Royal Air Force, which consists of four metal Supermarine "Southampton" flying-boats, each equipped with two Napier Lion engines and which concluded their Australian cruise on September 15 :—"Warm congratulations to you and all under your command on your return to Singapore and successful achievement with four machines of a flight of 25,000 miles, which affords convincing proof of the reliability and mobility of the flying-boat."

New Australian Air Lines

THE Commonwealth Government has just announced that it has accepted the tender of the Queensland and Northern Territory Aerial Services ("Quantas") for a weekly service between Brisbane and Charleville. They will pay a subsidy of £21,356 over a period of three years. This route, as previously reported in FLIGHT, provides intermediate stops at Toowoomba and Roma. At first, D.H.50 machines will be used on this route, but later, two D.H. 61 machines will be employed. A contract has also been accepted from the Larkin Aircraft Co., for a weekly air mail service between Camooweal and Daly Waters, for which a subsidy of £25,008 will be paid, and D.H. 61's (fitted with Handley-Page slots and Bristol "Jupiter" engines) will be employed.

The AIRCRAFT ENGINEER

FLIGHT ENGINEERING SECTION

Edited by C. M. POULSEN

September 27, 1928

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EDITORIAL VIEWS

It is with very considerable pleasure that we welcome back to our pages this month Captain F. S. Barnwell, Chief Designer and Engineer to the Bristol Aeroplane Company. Captain Barnwell's contribution is not, this time, of a highly technical nature, inasmuch as he is not describing something already achieved but merely throwing out a suggestion. For all that, his article will, we are sure, be read with considerable interest, as anything deserves to be which aims at improving the still only partly-solved problem of lateral control.

Briefly, Captain Barnwell's suggestion is the use of rotating pinions at the wing tips, the pinions either being all rotated the same amount, or, if found more effective, by different amounts, the angular movement in the latter case being obtained by making the operating levers of different lengths.

Captain Barnwell does not, in the present article, advocate the use of rotating wing-tip pinions for aircraft of "normal" type, but specially for monoplane wings of the "cantilever" type, in which there is always the possibility, when using ailerons of normal type, of setting up a deflection of the wing which may be in the opposite sense and so render the aileron control ineffective.

Captain Barnwell asks for the views of designers who may have had experience of this form of control. We are not aware that any machine has ever been built in which this form of lateral control was employed, but we have a distinct recollection of model tests with pinions, somewhat of the same type, having been made. At the moment we have been unable to trace the reports describing these experiments, but if our memory is not at fault, the experiments were carried out some years ago in one of the Canadian research establishments. What were the conclusions arrived at we do not remember. Perhaps any reader who happens to have read the reports will be good enough to let us know.

The use of stainless steels in aircraft construction is increasing fairly rapidly, and the article which Mr. F. Sigrist, co-director with Mr. Sopwith in the H. G. Hawker Engineering Co., Ltd., contributes this month deals with certain aspects of the practical use and working of this material. Mr. Sigrist is known throughout the aircraft industry as a very practical man, and his views cannot fail to be of interest.

A NOTE ON LATERAL CONTROL WITH A CANTILEVER MONOPLANE WING

By F. S. Barnwell

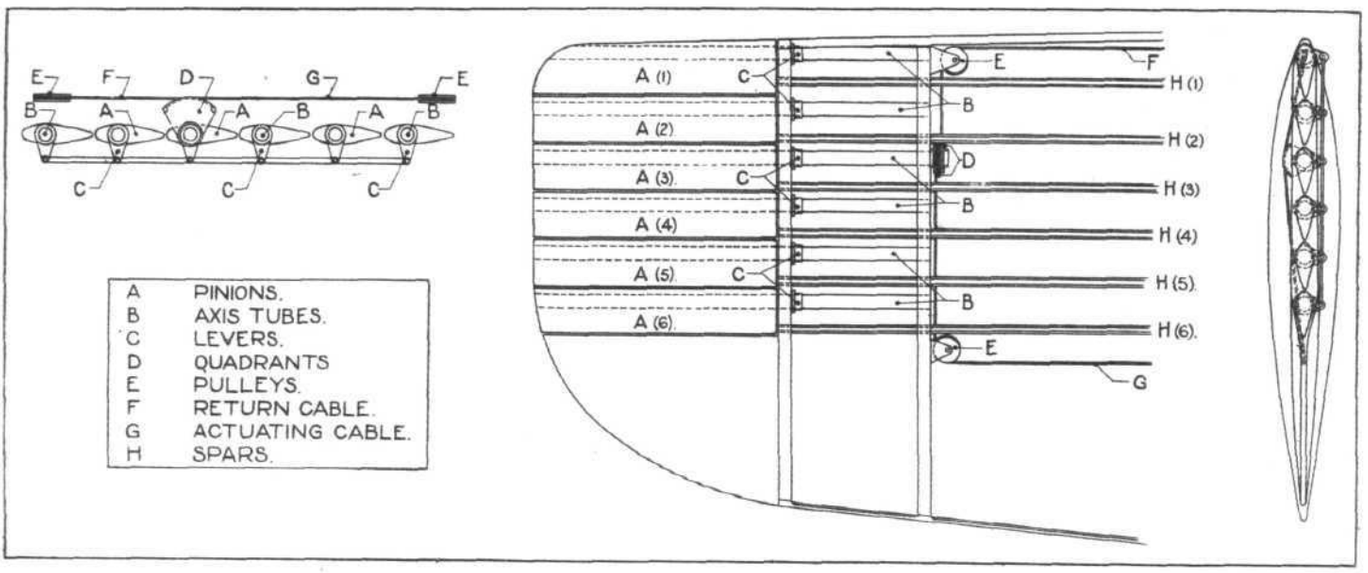
The "cantilever" monoplane wing remains a subject of considerable controversy, even when regarded simply as a supporting surface. Its advocates claim that though it is heavier per square foot than an externally-braced wing system of the same area, yet its higher maximum lift coefficient and the absence of the "parasitic" drag of external wires, struts and fittings amply compensate, as regards performance, for the additional weight.

The "cantilever" monoplane must, of course, be a heavier structure than the externally-braced mono or multiplane, because the root depth of the structure is less. Incidentally, I apologise for using the term "cantilever" monoplane as referring to a monoplane wing surface with no external bracing; I use the term perforce because it is current argot; actually each complete "side" of any wing system is a cantilever.

To what extent variations in lift and drag coefficients and in interference between airscrew, wings and body modify the disadvantage of greater weight of structure has been insufficiently investigated, so remains a subject for great argument—most really acrimonious argument being based upon lack of knowledge. Certainly the comparisons generally made between existing monoplanes and biplanes are more often misleading than informative.

However, to come to another aspect, generally less considered than that of ultimate strength but, under certain conditions, of the same order of importance, namely, the alteration in *shape* of the wing structure under air loads. A shallow cantilever of the same strength will, of course, bend more under load than will a deeper cantilever. This means, speaking rather loosely, that a "cantilever" monoplane (please refer to previous explanation and apology) will not only deflect to a greater extent at the tip under air load than will an externally-braced wing structure, but the twist (or alteration of "incidence") at the tip, due to travel of centre of pressure, will be greater; this latter point may be of great importance as affecting lateral control and liability to "flutter."

My own opinion is that the considerable use made of rigid covering (either ply-wood or sheet metal) for the wings of "cantilever" winged monoplanes has been necessitated largely in order to attain sufficient torsional stiffness; virtue is claimed for the necessity, but I remain unconvinced of the inherent superiority of plywood or sheet metal over fabric for the covering of a wing. Rigid covering must be heavier



PROPOSED SCHEME FOR A WING END WITH ROTATING PINIONS : The levers C are not necessarily of the same length, as drawn, but may each be made of a length suitable to give the desired degree of relative rotation to its pinion.

than fabric, and if the covering be utilised wholly or in part as structure, it is a very difficult practical proposition to induce it to develop anything like its ultimate strength.

As a reasonable compromise between the normal two spar fabric covered wing and the "structural shell" wing, there would appear to be certain advantages in a multi-spar structure. The advantages of this type of structure are that the individual tension and compression members of the spars are small, hence their centroids are farther away from the neutral axis of the wing section, and the rib weight is greatly reduced.

Unfortunately, although this form of structure works out very well for any one condition of loading along the chord, it is not economical for variation of this loading, because it is impossible, for other than one chosen condition, to ensure that all the members are apportioned their due shares of the load. The same argument applies, of course, to the "structural shell."

The obvious way out of the difficulty is to employ a wing section which gives little or no shift of centre of pressure with variation of incidence, and this does meet satisfactorily all conditions of flight until one considers the question of lateral control.

The use of an aileron, either balanced or unbalanced, produces an alteration of normal force (which is required to give a rolling moment), and in so doing produces a large shift of centre of pressure.

From all this it would appear that if one could achieve a method of lateral control (meaning a method of varying the normal force on the wing), which would produce little or no shift of centre of pressure along the wing chord, one of the most serious disadvantages of the "cantilever" monoplane would be eliminated.

The "Hill" type of separate rotating tip-aileron might meet the case, but one fears that it would add considerable weight and head resistance.

Rotating wing tips, as used once by Bleriot and as used today in the "Pterodactyl," and in the little Klemm Daimler monoplane, might be tried, but one is very afraid of tip flutter with these.

The shuttered slot as evolved by Mr. Fage at the N.P.L. sounds attractive, but one does not know if sufficient rolling moment can be achieved by it.

An idea that might achieve the requirements is to fit a set of rotating pinions to the end of the wing. This suggestion is illustrated in the diagram given herewith. By playing about with the lengths of the levers on the axis tubes of the pinions any desired angular setting for each and all of the pinions (consequent upon working the pilots' control column) can be achieved. Wind tunnel experiments on a pinioned wing tip of this form should indicate whether the idea be worth further consideration or not.

Obviously, any desired degree of balance is attainable, this being achieved by the location of the axis tubes in their respective pinions; presumably any desired load grading along the chord is attainable by suitable angular settings for each of the pinions; possibly a sufficient alteration of normal force could be achieved. The last is, of course, the doubtful point, and another possible snag is that the relative setting of the various pinions to achieve maximum alteration of normal force may be very different from that requisite to give the desired load grading.

My main object in writing this is to try to discover whether anyone has made any tests of a wing end of this form; I hope, therefore, that anyone who may have done this or who may have criticisms to make on the particular suggestion, or on any other opinion stated in this note, will be kind enough to give expression to his views.

STAINLESS STEEL FOR AIRCRAFT.

By F. SIGRIST, M.B.E., A.F.R.Ae.S.

The use of stainless or rust-proof steel in industrial and domestic circles is rapidly increasing, and a material possessing "stainless" or "rustless" properties naturally offers certain prospects to the aircraft constructor. That he has apparently not taken full advantage of this material is not entirely his own fault. It is only comparatively recently that stainless steel possessing the physical properties to render it an economical proposition has been available. The early stainless steels were not sufficiently reliable or consistent to warrant their use, but research has led to definite results, and the material used today is of good quality.

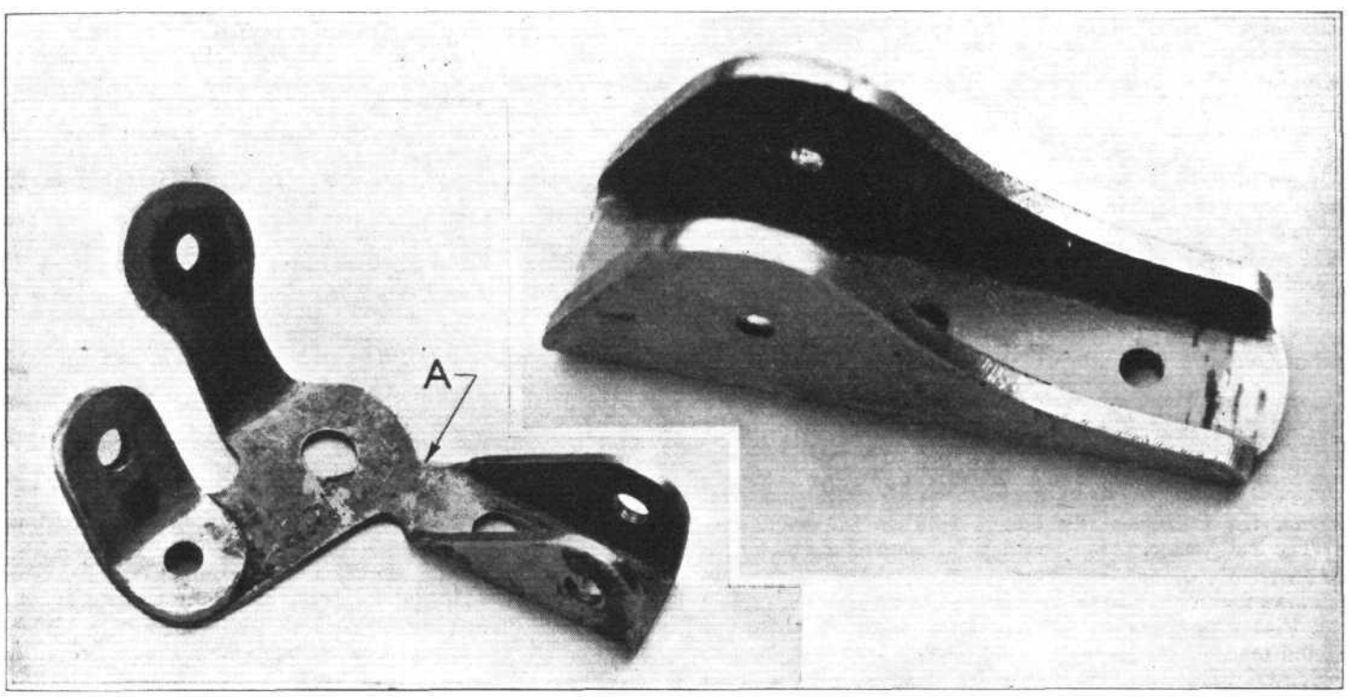
The stainless property of the steel is obtained by the addition of chromium, which occurs in nature principally as metal chromite commonly called chromic iron with the composition $FeCr_2O_4$. It is a very hard metal and can be highly polished. To produce material suitable for aircraft purposes nickel in certain defined proportions is included. The steel is usually manufactured in an electric furnace, the chromium being introduced in the form of ferro-chrome and the nickel in the shape of pure nickel. Care must be taken to exclude extraneous matter which might have a detrimental effect on the non-corrosive properties.

The advance of steel as a basic material for metal aircraft therefore brings stainless into consideration, and a few notes on the application may prove useful.

It is available in the form of sheet, bar, tube, strip, forgings and castings. Unfortunately it is more expensive than

alloy steels of the same physical properties, but with increasing demand it is probable that the price will become comparable. In the sheet form the material can be supplied to several specifications, but those most commonly used are D.T.D. 42 and D.T.D. 57. The former covers both hard (H) and soft (S) sheets. The mechanical properties of the hard sheets are obtained by cold rolling, and the sheets must not be heated above 400° C. before or during manufacture into fittings. Soft sheets possess a yield stress of not less than 15 tons per square inch with a maximum of not less than 40, but over a series of tests I have found the results slightly higher. Hard sheets show an average yield of 36·7 tons and an average maximum of 56·9 tons. For actual fittings I have used the hard material exclusively, partly because it means only stocking one class of sheet, and partly because it obviates any possibility of the two materials becoming mixed in course of manufacture with unpleasant possibilities. D.T.D. 57 is substantially the same chemical composition as D.T.D. 42, but gives a higher proof stress (between 50 and 60 T.) and is available in strip form. The actual working of these materials presents certain difficulties. D.T.D. 57 is on the whole an easier material from the manufacturing aspect. Where plates are nibbled it is safer to limit the thickness to 12 g. otherwise there is a risk of broken punches. Filing is equivalent to working S. 4 (H.T.N.S.) material, but the life of the file is shorter when used on stainless. D.T.D. 57 material is easier to bend than D.T.D. 42 H material and shows less tendency to minute cracks over a sharp radius. Drilling is the most difficult operation. High-speed drills give the best results, and where small holes are required as short a length as possible should be used to avoid buckling. Speeds should be somewhat lower than for mild steel and less for the H material, whilst the feed should be applied consistently but not too firmly and the drill should never rotate without cutting. When marking out it is advisable to centre pop lightly in order to avoid setting up a local hardspot. Occasionally it may be found that a high-speed drill is not effective on a hard place, and in this case a carbon drill, glass-hardened, will probably overcome the trouble, but it must be carefully used. If stainless is hand sawn, the hack sawblades must be of high quality. Pressings offer no difficulty, but if a deep drawing operation is called for, annealing is required. Soldering and brazing can be successfully carried out, but are not recommended. Welding has, I believe, shown good results, especially with material to D.T.D. 57 Specification, but I have not personally made tests.

On the bar material, specifications S. 62 and D.T.D. 76 represent those mostly used. S. 62 is a 46—52 T. steel, whilst D.T.D. 76 is a 50—55 T. material. Tests show that the figures for the latter are in practically every case exceeded. The former is initially cheaper, as the latter has a considerably higher chromium content, but at the same time it is easier to machine.



STAINLESS STEEL IN AIRCRAFT CONSTRUCTION : The photograph on the right shows a good example of a sharp bend in 10 S.W.G. Sheet, D.T.D. 57. The photograph on the left is of a fitting in 14 S.W.G. Sheet D.T.D. 42 H. Note the undercut A to obviate bending cracks. Bends transverse to the direction of rolling should be avoided if possible. The rivet and bush used on this fitting were of nickel steel, and the photograph shows where they have been affected by atmospheric conditions.

Generally speaking, the bar material, except for D.T.D. 76, should be machined at a lower speed than mild steel. Finishing cuts should be lighter, and there should always be an ample supply of lubricant. In tapping, it is important to note that the thread swells appreciably on stainless steel, and the drilling size prior to tapping should be very slightly larger than is the case with mild steel. It is somewhat difficult to set a hard-and-fast standard for machining, but the following table may serve as a guide to this operation.

	Rough Turning.	Finish Turning.
Cutting Speed, ft. min. ...	40/50	50/80
Depth cut	$\frac{1}{16}$ in.—$\frac{3}{32}$ in.	0·003—0·004
Feed (inches)	1/36	1/48
Cutting angles—		
Front rake	15°	15°
Side rake	10°	10°
Front clearance	8°	8°
Side clearance	10°	10°

On repetition work, external screw threads can be finished with the use of die heads, but the dies must be kept correctly ground. Forgings and castings present no particular difficulties, but it is advisable to order them in the descaled condition. Tubing has not yet been used on aircraft to any extent,

but is available in practically any standard section, although rather expensive. The composition is not available for publication, but the physical properties on round tubes are :—

	Yield.	Ult.	Elong. per cent.
As drawn	50·9	52·4	26
Softened	18·6	37·2	70
Welded with own material ...	18·8	34·1	11

This material hardens when cold worked, but can be squared without difficulty. On section tubes the figures are slightly inferior to those on round tubes. I have not yet had sufficient opportunity to test the strip material for rolling operations, but I understand that considerable success has been achieved with softened strip hardened and tempered. There is doubtless a big future for stainless materials on aircraft, especially when prices become more competitive. It is admitted that there are certain difficulties in working to be overcome, but to obtain a solution of the corrosion problem it is worth while. On some experimental work I have used stainless plate in preference to high-tensile sheet, and found that, despite the high initial cost, a saving has resulted, owing to the fact that heat treatment and test pieces were avoided. Solid and tubular rivets are available and work without difficulty. It is a matter for individual taste as to the finish employed on plate work. Personally, I think that if the fitting is sandblasted and then varnished, the result is pleasing and useful.

DESIGN STRESSES

By CECIL D. HOLLAND, A.M.I.Ae.E.

The weight of any aeroplane structure depends upon several factors, the following two being of prime importance :—(*a*) The load factor. (*b*) The design stresses of the materials of construction.

A load factor may be defined as :—The maximum possible load that may come on the structure, either by an air or ground manœuvre, divided by the normal load (*i.e.*, load in horizontal flight, or resting on the ground), plus a small amount for safety and errors of workmanship.

The design stress may be defined as :—The maximum stress the material would be subjected to if the structure were loaded to the amount "The load factor times the normal load."

The lightest structure weight is possible when the load factor is minimum and the design stress is the maximum.

The objects of this article are :—(*a*) To propose a policy for the determination of design stresses. (*b*) Comment on the needs of the design stress policy from a load factor policy.

Up to the present, the two policies have had a very haphazard co-operation, such as (*a*) high factors and high stresses ; and (*b*) low factors and low stresses. In the past, similar degrees of indifferent satisfaction have been obtained due to the two errors, in each case, tending to neutralise each other. In present-day structures, when using the latest materials, this satisfaction becomes even more remote.

It has been suggested, and even practised, to vary the load factor for different materials on the score of the so-called reliability of the material, *e.g.*, reduction of the load factor for steel struts, as against wooden ones.

The real point appears to be this. What is actually meant by the term "reliability ?" The dictionary meaning is "that may be relied upon" ; relied upon to what ? This calls for a further definition. *E.g.*, when one refers to the "reliability" of a certain aero engine, one infers the degree of freedom from breakdown in the defined times between overhauls. Thus, various types of engines may all have equal degrees of "reliability" when the defined times between overhauls are adjusted to suit each particular type of engine.

Now, consider the case of materials. Take the results of a large number of tests on any one type of material ; one can determine the maximum, mean and minimum values. If the tests have shown great variation in the results, the reliability relative to the maximum value would be very poor, since the results of any future tests are unlikely to reach or pass this value. The reliability relative to the mean value would be much better, because the results of about 50 per cent. of any future tests would reach or pass this value, and so the reliability is likely to be very good when the minimum value is used. Moreover, 100 per cent. reliability can be approached if a sufficiently low value be chosen for the reference point, for one does not infer infallibility for any future test.

It is generally agreed that the values given in the specifications of materials are sufficiently low, so that any future tests can be relied upon to surpass these specification minimum values.

It may be argued that it is the treatment the material receives at the aircraft constructors' works which introduces unreliability. This should not be so, as the effect of all treatments should be known, and are controlled by the double inspection : firms and A.I.D. The effect then, of working to a specification is to reduce all materials to one common degree of reliability, and thus the first comment on the load factor policy will be "That the load factor shall be constant, irrespective of the materials of construction." If this is not so, then the previously given definition for the load factor cannot stand.

For the purpose of this article it will be assumed that the amount allowed for in the load factor for safety and errors of workmanship is small compared with the remainder, and that the ultimate strength values of all materials is the minimum required by the specifications.

At first sight it would therefore seem natural to use the specification's ultimate figures as suitable values for the design stresses.

This has not proved satisfactory in practice due to the "permanent set" occurring in some parts of the structure, showing that the normal manœuvres produce stresses which exceed the yield points of the materials used : moreover the tubular and built-up metal struts and spars invariably fail by local buckling before the ultimate stress is reached.

This state of affairs produced advocates for the use of the yield point stress as a suitable design stress.

This policy has many disadvantages such as :—

(*a*) Increased structure weights.
(*b*) Excessive weight of non-structural members.
(*c*) Tendency to cause the disappearance from use of the light alloys because of their relatively low yield points.
(*d*) The inability exactly to determine the yield point of many of the materials, vide B.E.S.A. Pub. No. 56.

Having no clear-cut policy, the outcome of the two before mentioned view points was a half-hearted compromise, with nothing like a complete set of design stresses, merely a few tensile figures and an odd compression or shear stress, vide A.P. 970.

Disadvantage (*d*) in the yield point policy has been overcome to some extent by the introduction of the term "proof stress." The definition for the proof stress adopted by the B.E.S.A. for all non-ferrous materials for which a proof stress is likely to be applied is as follows :—"When the proof stress is applied to the specimen for a period of 15 seconds and removed, the specimen shall not have received a permanent set greater than 0·15 per cent. of the gauge length." No proof stress is included in B.E.S.A. aircraft steel specifications, but a proof stress is given in D.T.D. specifications for strip steel.

Experience indicates that the design stress should be a value between the yield point (or proof stress) and the ultimate failing stress, the problem being to determine this value.

Now the manœuvres of an aeroplane may be divided into two groups, normal and abnormal. For the purpose of this article it is not necessary exactly to define these groups beyond the statements that the abnormal manœuvres occur very seldom, and that the worst abnormal manœuvre is used to determine the load factor (definition given above) and that under normal manœuvres the structure shall not suffer permanent set ; in other words, the stress produced under normal manœuvres shall not exceed the yield (or proof) stress.

If it is possible to determine the ratio of the loads induced

by these two groups of manœuvres, then from the foregoing the ratio between the design and the yield (or proof) stress must be the same.

It has been the practice for a number of years to use the ultimate stress as the design stress when determining the sizes of bracing wires, and under normal manœuvres the wires do not want tightening and it is safe to assume that the stresses produced have not exceeded the yield stresses of the material.

As the yield point is 80 per cent. of the ultimate stress for the steel the bracing wires are made of, it would be on the safe side to take the ratio of abnormal to normal manœuvres as 1 to ·8; therefore the ratio of design stress to yield point stress should be the same.

(To be concluded.)

TECHNICAL LITERATURE

SUMMARIES OF AERONAUTICAL RESEARCH COMMITTEE REPORTS

These Reports are published by His Majesty's Stationery Office, London, and may be purchased directly from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, W.C. 2; 28, Abingdon Street, London, S.W.1; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; or 120, George Street, Edinburgh; or through any bookseller.

THE EXPERIMENTAL DETERMINATION OF THE TRAJECTORY OF AIRCRAFT BOMBS.—By H. E. Wimperis, M.A. R. & M. No. 1121 (Ae. 294). (25 pages and 13 diagrams.) June, 1928. Price 1*s.* 6*d.* net.

Early in the late war it became apparent that a scientific study would need to be made of the ballastic properties of aircraft bombs. This was necessary in order that knowledge might be gained of those factors relating to their flight which enter into the design of an aiming device.

The first question was to determine whether the relatively simple trajectory of a particle falling through a medium in which the resistance was proportional to the square of the velocity would be followed, even approximately, by bombs designed chiefly in relation to what they had to contain, rather than in reference to their probable ballastic coefficients. Full-scale experiments were made at various Air Stations, and use was made of a coal mine shaft n Yorkshire. It was found that the particle trajectory was sufficiently closely followed for the practical purposes of the moment, and a technique of bomb sighting was built thereon. This led to the introduction into the Air Forces of Great Britain of the system of sighting here described. A full-scale study was also made of the under-water trajectory of a bomb dropped above the sea. This was required for the purposes of the anti-submarine aircraft patrol.

FURTHER DEVELOPMENT OF AUTOGYRO THEORY. PARTS I AND II.—By O. N. H. Lock, M.A. R. & M. No. 1127 (Ae. 299). (43 pages and 3 diagrams.) March, 1927. Price 1*s.* 9*d.* net.

The general theory of the autogyro given by Glauert in R. & M. 1111,* is based on certain simplifying approximations and assumptions. The object of the present paper is to develop the theory still further by removing some of the approximations.

The approximations of R. & M. 1111 may be classified as follows:—

(1) The coefficient of axial velocity through the disc is constant over the disc, and is a small quantity.
(2) The lift coefficient of a blade element is proportional to the incidence, and the profile drag coefficient is constant.
(3) The flapping motion is expanded as a Fourier's series, and coefficients of cos 2ψ, sin 2ψ, etc., are neglected.
(4) Squares and higher powers of the ratio of the forward speed to the tip speed ($\mu = V \cos i / R\Omega$) are neglected throughout.

Part I.—Assumption 4 is dispensed with, all powers of μ beng retained. It had been remarked that it is theoretically possible to eliminate the flapping motion of an autogyro by substituting a suitable mechanical variation of the blade angle round the circle. The present investigation verifies that the two machines are, in fact, identical, and explains the fictitious discrepancy of the values of maximum lift/drag for the two machines.

After working out the force components, thrust and longitudinal force for both cases and verifying their identity, an alternative method of determining the drag is developed, based on considerations of energy loss; it has been verified that the resulting formulæ give results identical with those already obtained, and being more simple, take the place of the rather complicated formulæ for the longitudinal force.

The ratio of the value of maximum lift/drag of the present investigations (the true value for heavy blades subject to assumptions 1 and 2) to the value given in R. and M. 1111 is as follows:—

Blade angle	0°	2°	4°
Ratio	1·025	1·44	2·1

On account of the errors introduced by assumptions 1, 2 and 3 (especially 2) the actual value of lift/drag is probably lower than that obtained here, and may be in fact closer to the value obtained in R. and M. 1111.

Part II takes account of the general term in the flapping motion, so as to remove the restriction to infinitely heavy blades.

* R. & M. 1111. "A general theory of the autogyro."—H. Glauert.

TESTS OF A METAL AIRSCREW IN A CLOSED TUNNEL FOR COMPARISON WITH AMERICAN TESTS IN AN OPEN JET TUNNEL.—By H. C. H. Townend, B.Sc., and J. H. Warsap. R. & M. No. 1137 (Ae. 307). December, 1927. (4 pages and 5 diagrams.) Price 6*d.* net.

In this country airscrews have hitherto been tested in wind tunnels of the closed type, and the results obtained in such tunnels are subject to a correction for the effect of the walls, which becomes appreciable when the screw is not small in comparision with the tunnel. In wind tunnels of the open-jet type the interference of the wall is theoretically negligible. In America open-jet tunnels are normally employed for such tests, and relatively larger airscrews are habitually tested than is considered desirable with closed tunnels.

By testing a series of similar screws of different diameters in an open-jet tunnel it has been verified* that the interference is negligible for screws up to 4 ft. diameter in a jet whose diameter is 5½ ft.; and in order to provide a check on the accuracy of the theoretical correction commonly adopted† in this country it was decided to request the loan of a metal airscrew previously tested in an open-jet tunnel in America, and to test it in a closed tunnel. The airscrew, which was kindly lent for the purpose, by arrangement with the N.A.C.A., was a 3 ft. diameter 2-bladed metal airscrew of medium pitch.

The correction on the velocity observed in a closed tunnel was usually less than 4 per cent., except for the highest thrusts obtained near static conditions, where it rose to 15 per cent. This correction, over most of the range, is not much greater than the experimental errors. Comparison with the American results shows excellent agreement on thrust over the entire range, while the torque is slightly higher, so that the maximum efficiency is about 1½ per cent. lower than that obtained in the American test.

* See Experimental Researches on Air Propellers, N.A.C.A. Report No. 14. The question is discussed in R. & M. 1033: On the advantages of an open jet type of wind tunnel for airscrew tests.—H. Glauert, M.A., and C. N. H. Lock, M.A.

† R. & M. 662. Some notes on the theory of an airscrew working in a wind channel.—R.A.E.

THE DETERMINATION OF THE ELASTIC MODULI OF A MILD AND A MEDIUM STEEL.—By H. E. Smith, B.Sc., and H. L. Cox, B.A. R. & M. No. 1138 (M. 53). (7 pages and 3 diagrams.) June, 1927. Price 6*d.* net.

The general object of the research was to determine as accurately as possible the elastic constants of certain materials, particularly of the standard Aeronautical Research Committee research materials composed of a mild and of a medium steel.

If the materials studied proved to be elastically isotropic, the work would involve only the determination of Young's modulus and Poisson's ratio; but, although in ordinary test work the materials are usually assumed electrically isotropic, there is in many cases very little evidence that this assumption is justified. Therefore, quite apart from the importance of an exact knowledge of the elastic constants as such, it is of interest to see whether the materials are truly isotropic, or, if aeolotropic, what form of elastic aeolotropy obtains.

The values of four of the moduli were determined for both steels.

There is in the case of the medium steel no choice but to assume the material isotropic; while in the case of the mild steel, evidence of aeolotropy is slight, and not entirely reliable.

THE CONNECTION BETWEEN LIFT AND CIRCULATION FOR AN INCLINED FLAT PLATE.—By A. Fage, A.R.C.Sc., and F. C. Johansen, B.Sc. R. & M. No. 1139 (Ae. 308). (7 pages and 1 diagram.) January, 1928. Price 6*d.* net.

The relation which connects the lift experienced by a unit length of a two-dimensional body moving through a fluid of density with a definite circulation was derived by Kutta and Joukowski on the assumption that the motion was irrotational. Messrs. Bryant and Williams have demonstrated experimentally (R. & M. 989) that this relation also holds with good accuracy when an aerofoil is advancing through a viscous fluid such as air, provided that the contour line around which the circulation is measured does not approach at any part too closely to the aerofoil, and also that it cuts the trailing wake approximately at right angles to the direction of motion of the aerofoil. Further, Prof. Taylor has shown theoretically in an appendix to the same paper that the Kutta–Joukowski relation holds for the Kirchhoff–Rayleigh discontinuous motion behind an inclined flat plate, if the contour be chosen so that the part which crosses the wake is some distance behind the plate and also at right angles to the general direction of the motion. In addition, he states that, even should the contour cross the wake close to the plate, provided it were perpendicular to the general direction of the current, the circulation would differ only slightly from that which corresponds with the lift.

In the present paper it is shown that the Kutta–Joukowski relationship between lift and circulation holds very closely for an inclined flat plate in an air stream, provided that the contour around which the circulation is taken is large and that it cuts the wake in a straight line perpendicular to the direction of the undisturbed motion. Also, the total strength of the vorticity at the front of the plate can be determined from observations of pressure on the plate.

THE DETERMINATION OF THE HORSE-POWER HEIGHT FACTOR OF ENGINES FROM THE RESULTS OF TYPE TRIALS OF AIRCRAFT.—By J. D. Coales and A. L. Lingard. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1141 (Ae. 310). (8 pages and 7 diagrams.) October, 1927. Price 6*d.* net.

The height horse-power factor of engines enters into all performance calculations of aircraft, and the average values of the power factor have here been determined for heights in a standard atmosphere from the type trial reports of a large number of aircraft.

The method of obtaining the power factors of an engine in a standard atmosphere appears to yield reasonable values for this factor, but it gives no clue as to the dependence of the factor upon pressure or density respectively. This is because temperature, pressure, and density in a standard atmosphere can each be expressed as definite functions of either one or both of the others.

If it is assumed that the indicated horse-power is proportional to air density, the (brake) horse-power height factor corresponds with reasonable values for the mechanical losses.

THE STRUCTURE OF VORTEX SHEETS.*—By A. Fage, A.R.C.Sc., and F. C. Johansen, B.Sc. R. & M. No. 1143 (Ae. 311). August, 1927. (19 pages and 13 diagrams.) Price 1*s.* net.

(1) The outstanding features of the two-dimensional flow behind an infinitely long obstacle of bluff cross-section immersed in a moving fluid are now well known. Two thin bands of vorticity are shed at the after end of the obstacle and at some distance behind, these bands break up with a uniform frequency into two trials of discrete cylindrical vortices of opposite direction of rotation, to form a vortex sheet.

(2) In an earlier paper† the writers describe an investigation undertaken to furnish information on the flow of air behind an inclined flat plate. Experiments were then made to determine, for several angles of inclination of the plate, the frequency and speed with which the individual vortices pass downstream, the dimensions of the vortex system, the average strength of the vortices, and the rate at which vorticity was leaving the edges of the plate.

The present wind tunnel investigation can be regarded as a continuation of this earlier work, in that it includes a more detailed examination of the structure of the vortex sheet shed from the edge of a plate set normal to an air stream. To obtain more generality, an examination has also been made of the sheets shed from other bodies of widely different forms—such as an aerofoil, a cylinder, and wedges—and it has been possible to show how some of the characteristics of these sheets, such as the velocity distribution across a section and the rate of opening-out, depend on the form of the body. Some of the experimental results are compared with those predicted by the theory‡ of the rate of spread of turbulence in a vortex sheet, which has been developed by W. Tollmien on the basis of earlier work by L. Prandtl. Measurements have also been made to determine the longitudinal spacing between consecutive vortices in the vortex sheet. Finally, an analysis has been made to determine to what extent these characteristics of the vortex sheet are influenced by the structure of the sheets leaving the body.

* "Phil. Mag.," Vol. V., February, 1928.
† "Proc. Roy. Soc.," A., Vol. CXVI (1927); also R. & M. 1104.
‡ "Zeitschrift für Angewandte Mathematik und Mechanik," December, 1926 (Tollmien), and April, 1925 (Prandtl).

ON THE FLOW OF A COMPRESSIBLE FLUID PAST AN OBSTACLE.—By Dr. H. Lamb, F.R.S. R. & M. No. 1156 (Ae. 321). April, 1928. (5 pages.) Price 4*d.* net.

Mr. Glauert in his recent paper* on the two-dimensional flow of a frictionless compressible fluid past an obstacle has arrived at the interesting result that the lift due to circulation is given by exactly the same formula as in the case of incompressibility, provided the velocity of the stream is less than the velocity of sound in the undisturbed fluid.

The flow past a circular cylinder, without circulation of the fluid round it, was discussed some years ago by Rayleigh† by a method of successive approximation. Considering the pressures on the surface he found that the resultant force on the cylinder was zero, as must evidently be the case when the configuration of the streamlines is symmetrical. It is here shown that his method can be used to verify Mr. Glauert's more general result, so far as the approximation holds.

* "Proc. Roy. Soc." Vol. CXVIII, page 113 (1927); also R. & M. 1135.
† "Phil. Mag.," Vol. XXXII, page 1 (1916); Sc. Papers, Vol. VI, page 402.

THE EFFECT OF THE STATIC PRESSURE GRADIENT ON THE DRAG OF A BODY TESTED IN A WIND TUNNEL.—By H. Glauert, M.A., F.R.Ae.S. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1158 (Ae. 323). March, 1928. (12 pages and 4 diagrams.) Price 9*d.* net.

It has been customary in recent years to apply a correction to the observed drag of a body tested in a wind tunnel to allow for the effect of the observed static pressure gradient on the hypothesis that the additional drag experienced by the body is equal to the product of the volume of the body and of the observed pressure gradient. An attempt has here been made to establish the correction on a more rational basis.

The correction is shown to be proportional to the product of the pressure gradient and of a certain effective volume, which is in all the cases examined, greater than the volume of the body, and it is shown that there is such a correction even in the case of a flat plate normal to the wind. The conventional formula is probably sufficiently accurate in most cases, but for high accuracy, when the correction is required to be in error by less than 20 per cent., the effective volume should be calculated by the method suggested in the report.

A THEORETICAL ESTIMATE OF THE PRESSURE GRADIENT IN A WIND TUNNEL.—By H. Glauert, M.A. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1159 (Ae. 324). April, 1928. (10 pages.) Price 6*d.* net.

The pressure gradient which is known to occur in wind tunnels of the N.P.L. type gives rise to an additional drag force on a model above that which would occur in a uniform stream.

A theoretical expression has been obtained for the pressure gradient due to the development of a boundary layer of retarded air along the walls of a wind tunnel, and as the value so obtained was less than that observed, the analysis has been extended to examine the effect of any leaks in the tunnel walls. A satisfactory explanation of the observed values is then obtained.

The observed pressure gradient depends only in part on the development of the boundary layer, and subsidiary causes, such as leaks in the tunnel walls, may be equally important. It is important, therefore, to avoid any leaks near the working section of a wind tunnel when testing a model whose drag is susceptible to the pressure gradient.

VERSLAGEN EN VERHANDELINGEN VAN DEN RYKS-STUDIEDIENST VOOR DE LUCHTVAART, AMSTERDAM, DEEL IV

By the kindness of Dr. E. B. Wolff, Director of the Dutch equivalent of our N.P.L., we have received Vol. IV of the Dutch Reports and Memoranda. Some very interesting work has been carried out, and Dr. Wolff has very kindly sent us brief summaries in English, of the Reports contained in the latest volume. These summaries follow.

REPORT A. 105.—FURTHER EXPERIMENTS ON THE INFLUENCE OF A ROTATING CYLINDER IN A WING SECTION.

This investigation is a continuation of the experiments described in Report A.96 (Vol. III). The drag as well as the lift was measured in the most important cases and the influence was determined of a fixed nose, adapted in front of the cylinder, the ratio of the circumferential speed of the cylinder to the wind speed and the width of the slot between the cylinder and the tail-piece. The results are compared with a normal wing and a slotted wing.

REPORT A. 98. AIR RESISTANCE OF TWO AEROPLANE RADIATORS.

Purpose of the tests was determining the resistance to motion of two radiators whose cooling power had been determined already (Report A.92, Vol. III). The coolers have been exposed normally as well as in a yawed position to the air stream. The coefficients given in the report apply only to the cooling core.

REPORT A. 129.—EXPERIMENTS ON THE VELOCITY DISTRIBUTION IN THE BOUNDARY LAYER OF AN AEROFOIL WITH ROTARY CYLINDER.

Earlier experiments have shown (Reports A.96, Vol. III and A.105) that a rotating cylinder accommodated in an aerofoil, may have an important influence on the flow. To check the explanation of this phenomenon given there, closer investigation of the flow was made. The velocity in proximity of the model surface was measured with a hot-wire anemometer. The pression distribution on the upper surface has been measured in the usual way.

The results confirm the surmise made in Report A.105 that an important momentum is imparted by the cylinder to the air in the immediate proximity of the surface, but that the direct action is confirmed to a very thin layer.

REPORT A. 130.—DISCUSSION OF THE TESTS ON THE BOUNDARY LAYER OF THE AEROFOIL WITH ROTATING CYLINDER.

The results of the velocity-measurements in the boundary layer described in Report A.129 are considered in detail. For a wing with normal section (aerofoil with cylinder at rest and slot filled up) the area with a steep velocity gradient is limited to the immediate proximity of the surface. Probably at the small angle of incidence there is already a dissolution of the after part of the upper surface.

With rotating cylinder the velocity in the boundary layer of the upper surface is increased, the dissolution on the after part is reduced. At a short distance of the lower surface of the cylinder there is probably a counter-current.

With stopped cylinder and open slot an important retardation in the lower part of the boundary layer is followed by a more vigorous dissolution on the after part.

REPORT M. 219.—MECHANICAL PROPERTIES OF SOME MATERIALS THAT ARE USED FOR THE CONSTRUCTION OF AEROPLANE.

Generally speaking, the stresses that are tolerated in aeronautical constructions are higher than in other technical constructions. Therefore it is necessary to determine carefully the highest stresses which may occur and also the actual properties of the material used. Many tests were made on different steels, woods, light-aluminium alloys and fabrics for covering. The results of these tests together with many data from other publications are shown in tables.

REPORT V. 175.—THE INFLUENCE OF THE RIBS ON THE STRENGTH OF THE MAIN PLANE SPARS.

The ribs joining both main spars of an aeroplane wing bring about a repartition of the load by which the shearing force and bending moments acting on the spars may be greatly affected.

The report gives theoretical calculations of the influence of the ribs. To simplify the problem the wing covering has been neglected.

Firstly, the formation of the differential equations is given. These equations contain only the deformations of the spars as unknown quantities. A simplification of the equations, important with regard to the solubility is obtained by assuming the ribs to be infinitely rigid. For the most general case where the moments of inertia, the distance between spars and the load are arbitary functions of x, an approximate method of solution has been developed. If the ratio between the moments of inertia is constant, another method may be applied. For the simplest case of prismatical spars, constant distance between spars and uniform load the general solution is given.

A number of cases has been calculated, in which the moment of inertia of the spars from the centre of the wing to the tips varies.

REPORT A. 32. EXPERIMENTS ON THE ACTION OF THE AILERONS OF A THICK TAPERED WING.

Rolling and yawing have been measured at angle of incidence α ranging from $-5°$ to $+25°$ and angles of yaw β of 0°, 10° and 20°, so both normal and stalled flight and sideslipping are considered.

The report is divided in the parts: Description of the model; Description of the method of testing; Reduction of test data; Results of the experiments with angle of yaw $\beta = 0°$; Results of the experiments with angle of yaw $\beta = 0°$; Conclusions; Appendices. Appendix I gives a very complete summary of the existing literature, Appendix III gives a theory of the tunnel-wall-interference.

REPORT A. 153.—THE RESISTANCE OF AEROPLANE WHEELS.

Experiments have been made in order to investigate in how far the resistance of wheels could be diminished by various modifications. These modifications were: adding a streamline fairing and covering up the re-entering angle made by the rim and some holes.

It is shown that by adding the fairing and smoothing the sides, the resistance is appreciably decreased.

FLIGHT
& AIRCRAFT ENGINEER AIRSHIPS

R.A.A.F. SURVEY FLIGHT ROUND AUSTRALIA

11,890 Miles in Formation. July 21 to September 10, 1927

THE full report of the Survey Flight round Australia by three aeroplanes of the Royal Australian Air Force last year has just reached this country. The flight was undertaken with the object of gaining first-hand information of aerodromes and landing grounds throughout the Commonwealth, the nature of the country along prepared routes and elsewhere, flying conditions in northern and central Australia, and of existing organisations for the handling and operation of aircraft, from the defence point of view.

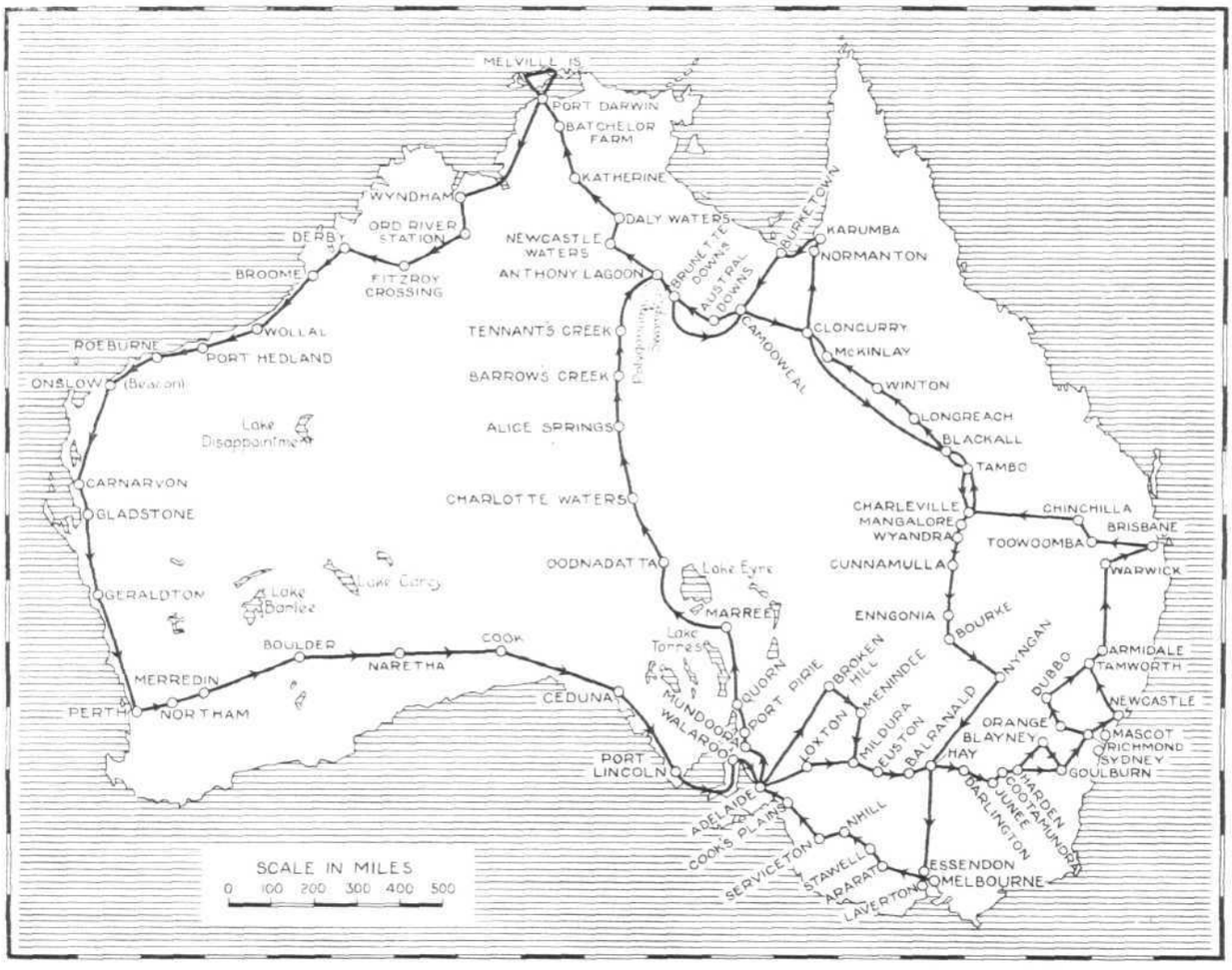
Previously two other survey flights had been carried out by the R.A.A.F.: (1) a seaplane flight round the coast of Australia, in 1924, in a Fairey III.D (Eagle), by Wing-Commander S. J. Goble, C.B.E., D.S.O., D.S.C., acting Chief of the Air Staff, with Flight-Lieut. I. E. McIntyre as pilot; and (2) a seaplane flight among the Pacific islands, in 1926, in a D.H.50, by the Chief of the Air Staff, Group-Captain (now Air Commodore) R. Williams, C.B.E., D.S.O., with Flight-Lieut. McIntyre as pilot.

A survey flight round the interior of Australia was also made in 1926 by the Director of Civil Aviation, Col. H. C. Brinsmead, O.B.E., M.C., in a D.H.50 piloted by Capt. E. J. Jones, M.C., D.F.C., but the objects of this flight were other than defence.

It has become a tradition for survey flights by the R.A.A.F. to be undertaken by the C.A.S. in person, and accordingly Group-Captain Williams headed the flight last year. This flight, however, differed from the two previous ones in being carried out by a formation of three machines, one D.H.50 and two D.H.9's, all driven by "Puma" engines. The Commission, as one might term it, consisted of the C.A.S., the Director of Works and Buildings at R.A.A.F.H.Q., Sqdn.-Ldr. A. Hepburn, D.F.C., and a technical officer, Flight-Lieut. A. W. Murphy, D.F.C., A.F.C. There were two N.C.O. pilots and two other airmen in the party.

The route was planned so as to cover as much ground as possible without flying the same track twice when this could be avoided. It was also very necessary to arrange for supplies of fuel and oil in the most convenient way, and therefore ordinary Plume motor spirit and B.B. mobiloil were used throughout with every satisfaction. It is a point for engine designers to remember when catering for the Australian market that engines must be able to run on ordinary motor fuel.

The flight started from Laverton aerodrome, Victoria, on July 21 last year. The winter season was chosen so as to get the best weather in the tropics, while in southern Australia the weather in July and September is reasonable. The first day's journey was to Adelaide, but the landing there was made in rain and semi-darkness, and both the



THE ROYAL AUSTRALIAN AIR FORCE SURVEY FLIGHT AROUND AUSTRALIA: Sketch map of the route followed and the places visited by the three aeroplanes: two D.H. 9's and one D.H. 50, all with Siddeley "Puma" engines.

D.H.9's damaged their undercarriages, though these had been strengthened by extra bracing wires. Both these machines were part of the "gift" equipment by the United Kingdom Government after the Armistice, while the D.H.50 was the machine which had made the flight to the Solomon Islands in the previous year. The "9's" were left at Adelaide for repair, while the "50" went on alone along the Larkin air route to Broken Hill, Mildura, Hay and Cootamundra. Bad weather prevented it from getting direct to Richmond, and course was changed to Goulburn. Richmond was reached on July 25. The other two machines should have rejoined the leader there, but had not left Adelaide, so the "50" started alone again and landed to fuel at Armidale. Taking off from the racecourse there, the propeller fouled a football goal-post, which made a hurried landing into a fence the only possible course. The aeroplane had to be trained back to Randwick for repairs, but by August 4 it was ready again at Richmond, where, in the meantime, the other two machines had arrived. No

other troubles of any moment were encountered on the flight.

On August 5 the flight arrived at Armidale, and reached Brisbane next day. On August 7 it reached Charleville, and then followed the Quantas route up to Normanton. This tiny town on the Gulf of Carpentaria was holding its annual race meeting and all accommodation was booked, except the hospital, in which the members of the flight slept that night. Next day the flight made straight for Camooweal, the present western terminus of the Quantas route, and then followed the future extension of that route, Brunette Downs, Newcastle Waters, Daly Waters, Katherine, to Port Darwin, which was reached on August 12.

Two days were spent at Darwin, and one or two small overhauls were made in the railway workshops. H.M.A.S. *Geranium* was in harbour, and the officer commanding it was taken for a flight over Melville Island, which has never been properly charted. The existing charts showed several slight indentations on the north coast of the island, which from the air were seen to be large bays and rivers extending many miles inland. The island is heavily timbered.

On August 15, the flight went on to Wyndham, which is soon to become the terminus of the West Australian Airways. The future extension of that route was followed via Hall's Creek to Derby, the present northern terminus. The airways route was then followed down to Perth, which was reached on August 20.

On August 21, the flight turned eastward again, following more or less what will be the air route between Perth and Adelaide, namely Meredin, Kalgoorlie, Cook, but from the last-named they turned south and crossed the coast over the Great Bight. Heavy rain forced the machines down to 30 or 40 ft. above the sea, and they lost each other, but they joined up again on re-crossing the coast at Ceduna. They made Port Lincoln the same night (25th) and next day arrived at Adelaide.

There the engines were given a top overhaul, and while it was in progress, the C.A.S. dashed off to Melbourne and spent a few days in his office.

On September 2, the flight started again, heading north once more, through the very centre of Australia, a route which has not very often been flown. Their course was Port Augusta, Oodnadatta, Alice Springs, Tennant's Creek, Anthony's Lagoon. Here the machines turned east and south again and retraced their path down the Quantas route to Charleville. There they headed due south to Bourke and reached Hay via Nyngan. From Hay they followed the Larkin route back to Melbourne and arrived home at Laverton on September 10.

The Country Traversed

The above is a very brief outline of the course of the flight. The observations which follow in appendices to the report are very interesting and important. The weather is dealt with first. In the south in winter time all sorts of bad weather may be expected, and the flight experienced a number of unpleasant varieties. In the Tropics the winter was found perfect for flying. The machines were heavily loaded with spares, and their climb in tropical air was slow. In the mornings it was calm up to 10 or 11 a.m., but then bumps reached to a great height, and sometimes the machines were unable to climb above the bumpy area. Radiators were apt to boil when the machines tried to climb.

Geographically, Australia, on the whole, is reported as particularly favourable for flying throughout the year. The country is generally undulating with few great heights, and, apart from the ranges running up the east coast, and across Victoria north of Melbourne, and small ranges round Perth and Adelaide, there are no hills to speak of.

From Melbourne to Adelaide the country is mostly grazing and agricultural, though parts of South Australia have not yet been cleared. Grazing country extends up to Broken Hill, but south of the latter town no clearing has been done, and low scrub would make a landing without damage very improbable. From Hay eastward to Junee the route passes over plains, crop and grazing, but just before reaching Cootamundra hills are encountered, and therefore, for defence purposes, Junee would be preferable to Cootamundra as a halfway halt between Melbourne and Sydney. From Cootamundra to Bathurst is hilly, rising to a little over 2,000ft. but landing grounds could easily be selected. North from Goulburn stretch the Blue Mountains, but there is a coastal plain where landings are possible.

Tree stumps are one of the curses of Australian agricultural land. They often project from 3 to 5 ft. and are difficult to observe from the air. The introduction of a "stump jump" plough permits the farmers to leave them *in situ* much to the annoyance of airmen.

Broken country, some suitable, some unsuitable for landings continues up to Brisbane, but when one gets west of Toowoomba one strikes open plains where one can land anywhere. South of Charleville there is so much scrub that a safe landing would be impossible, except on a prepared ground. The Quantas route, needless to say, is kept in good working condition, and the same can be said of all the regular air routes in Australia. The extraordinary regularity of all these services is a sufficient answer to any enquiries about the practicability of their routes.

A special interest attaches to the reports on northern Australia because so little detail was previously known about the flying conditions there. Normanton is a small town of some 540 inhabitants, and the country between it and Burketown consists principally of swampy flats which might make landing grounds in winter. The shore round the mouths of the Norman and Flinders rivers is sandy, but west of Morning Inlet it is covered with mangrove swamps. Most of the country on to Camooweal is open West of that small, but now famous, town is cattle country, innocent of roads and traversed only by tracks. Tussocky grass is the only difficulty to be guarded against when landing. This type of country extends on to Anthony's Lagoon and Newcastle Waters, where timber is again found. Along the Overland Telegraph line the country is wooded, and though a ground has been prepared at Katherine, the tropical vegetation grows quickly, and it is reported that "Grounds in this part of the Commonwealth should not be reckoned as usable unless steps have been taken to ensure their being so." Timber extends on to Darwin. There is a landing ground at Batchelor Farm. At Darwin the aerodrome is well maintained by convict labour.

On that part of the coast there are numerous sheltered inlets suitable for seaplane operations, but a site for a regular seaplane station would be difficult to find.

To the south-west of Darwin the country is scrubby and swampy, and there is no habitation until the Daly River is reached. This is a fine river with a good supply of water even in late summer. The country along the coast up to Wyndham was found to be flat (though at least one map by a well-known map-making firm shows ranges of hills there). There are hills in the neighbourhood of Wyndham, and south of it there stretches the Albert Edward range down to Hall's Creek, where it ends abruptly. From Wyndham on, numerous landing grounds have been prepared for West Australian Airways.

Omitting the report on the West Australian Airways route, we may pass on to Perth, whence the new airway will soon be opened to Adelaide. First the flight passed a small range of hills not more than 30 miles in width, and found undulating wheat and orchard land for 50 miles up to Northam. Then it became almost flat and covered with light timber, except along the railway line where it is being cleared. The wheat country ends at Southern Cross, but is always being extended. Similar country extends up to the Kalgoorlie goldfield, where there is a rather small landing ground at Boulder. At Naretha, 200 miles on, a stretch of flat timberless country commences, and extends for 400 miles and south to the coast. It is tussocky and sometimes rocky, and is not quite so good for landings as it appears from the air.

From Port Lincoln the crossing to the York Peninsula involves no sea crossing of more than 20 miles, as there are islands in the gulf. Flat wheat country extends up to Adelaide. Hills, not of much height, extend north of Adelaide, and wheat is grown as far as Hawker, where sheep country commences. This extends to north of Charlotte Waters. Then one meets more timber and cattle country up to the MacDonnell range, a narrow ridge no more than 3,428 ft. high, in which Alice Springs is situated. There is more flat country until the Murchison Range, about 1,500 ft., is met and this continues up to Tennant's Creek. White ant hills are prevalent in that part, and form the chief obstacle to making landing grounds. The return down the Quantas line and along a prepared route from Charleville to Melbourne *via* Bourke and Hay does not call for record here.

Equipment

The engine of the D.H.50 was equipped with a tropical radiator. The radiators of the D.H.9's were increased by 20 per cent., which proved a suitable compromise. The normal oil used was BB, but in the tropics a quantity of B was added whenever procurable. The only mechancal troubles of the engines worth recording were leaking cylinder heads, and no forced landings occurred. When overhauled at Adelaide, after flying 113 hours, the blocks of the two

engines with leaking cylinders were changed. The engines were decarbonised, new rings fitted, and valves ground in. Nothing further was necessary.

The "9's" had wheels made from Michelin motor-car rims fitted with Dunlop balloon car tyres. These proved quite satisfactory.

The D.H.50 started with aero wheels and special square tread tyres, but there was difficulty through the walls breaking, and at Longreach they were changed for a pair of ordinary aero tyres as used by Quantas. These had one or two punctures. At Adelaide wheels and tyres similar to those on the D.H.9's were fitted, and no further tyre trouble was experienced. It was found advisable to use smooth tyres, as a tread was apt to pick up pebbles and cast them into the propeller.

Some wood shrinkage was noticed, and the machines required regular trueing and tightening up. The report seems in favour of metal machines, but reflects that the wooden machines of the airways give from 1,200 to 1,500 hours before overhaul.

Special propellers were designed and made at Randwick. They proved so satisfactory that they were standardised for D.H.9's throughout the R.A.A.F. The oleo undercarriage of the D.H.50 proved far superior to the standard "V" of the D.H.9's. The former also had a far superior tail skid, and a similar type was afterwards fitted to the "9's."

Survey

"It might probably be said with truth that Australia is one of the worst-mapped countries in the world." Such is the conclusion of the report after the flight had wrestled with the maps supplied to them before the start. Most of these maps were nothing more than plans. No contoured maps of the Commonwealth exist, except of a small portion covered by the Army Survey Section. By ordinary ground methods the mapping of the Commonwealth would probably take hundreds of years to complete, and cost a huge sum. The only practical way of dealing with the problem is by means of air photographs. The suggestion is made in the report that the R.A.A.F. should undertake an aerial survey of the Commonwealth. F. A. de V. R.

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Liverpool-Belfast Experimental Air Mail Test

ON September 22 the Short "Calcutta" flying-boat flew from Liverpool to Belfast and back as an experimental test flight for this week's service. On board were Sir Sefton Brancker, Sir F. Bowring, Capt. Mace, Mr. S. Salvidge and representatives of Imperial Airways. The landing was made in Musgrave Channel and the Lord Mayor entertained them to a luncheon. The return air journey was made in the afternoon. The service was scheduled to start on September 24 and continue until September 29, providing a daily mail service each way between the two cities. Mail carried by this service required a special fee of 1*d.* per 2 ozs. in addition to ordinary postage and registration or express fees; the usual Air Mail label being affixed (Yes, we have no air stamps!). On the inaugurating flight the machine arrived in Musgrave Channel nearly an hour late, owing mainly to bad weather conditions. After being officially inspected by the Lord Mayor of Belfast and others, the "Calcutta" made a flight over the city, and later returned to Liverpool with a full complement of mails and passengers.

Mail 'Plane Down

A MAIL hydroplane working on the Marseilles to Algiers route left the Balearic Isles early on September 22 and sent out wireless appeals for assistance three hours later as it had been forced down at sea by engine trouble 50 kms. from Cape Palos. A relief machine was at once despatched from Perpignan, but returned after a fruitless search of three hours. But in the afternoon it was found and taken in tow by the French steamer *Chassinand*, with the airmen safe. On the same day another mail aeroplane, which left Casablanca, Morocco, for Cape Juby, disappeared, but was eventually found undamaged near Agadir, S. Morocco.

Sir Philip Sassoon's Air Tour

THE Under-Secretary of State for Air, Sir Philip Sassoon, will leave England by air on September 29 to visit the Royal Air Force stations in Malta, the Middle East, Iraq, and India. The route to be followed will be Plymouth, Marseilles, Naples, Athens, Cairo (whence a visit will be made by air to the Air Force squadron at Khartoum), Amman, Baghdad, Basra, the Persian Gulf, Karachi. The type of aircraft which will be employed for the greater part of the tour will be a Blackburn "Iris" flying-boat with three Rolls-Royce Condor engines and manned by the normal service crew. The Under-Secretary of State will spend nine days in India and will visit by air the squadrons in that country. He will leave Karachi on October 24 for England in the "Iris" which is due at Plymouth on November 6. On the return journey a visit will be made to Malta, which will be reached via Aboukir and Benghasi.

Sir John Salmond in New Zealand

AIR VICE MARSHAL SIR JOHN SALMOND has extended his visit to New Zealand after circling Australia by air. He reached Auckland from Sydney and is to confer with the Government at Wellington. He is reported to have said that there was no reason why the airship now being built for the Government should not visit New Zealand as well as Australia in two years' time.

The Speed Record

ON September 24, Flight-Lieut. D'Arcy Greig took out the Supermarine-Napier seaplane in which the record is to be made for the first time, but he contented himself with taxi-ing as visibility was bad.

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King's Cup Winner Flying to Africa

CAPT. L. HOPE, who won the King's Cup Race twice, and left London recently on a flight to Cape Town via Kenya Colony, is suffering from sunstroke and will probably be delayed at Atbara for a few days.

World's Tour by Light Aeroplane

VICOMTE AND VICOMTESSE DE SIBOUR, who are attempting a world's flight in their D.H. Gipsy-Moth, flew from Tangier to Fez on September 24. They started from Stag Lane on September 14, and first flew to Paris.

Cattewater Extensions

As a result of the decision to re-open Cattewater Air Station, Plymouth, as an active Royal Air Force station, extensions are to be carried out. The present buildings will be reconditioned, lecture rooms provided, sick quarters improved, and accommodation for officers and staff increased. The present slipway will also be extended, and portions of the Cattewater dredged. When this is completed, the largest flying boats will be housed.

"Crazy" Pilot Hurt

SQDN. LDR. J. NOAKES, the "Crazy" flying expert and originator, was injured on September 20, whilst testing a new machine at Martlesham Heath Experimental Station. His injuries were not serious.

For Canada

MR. J. D. PARKINSON, instructor to the Newcastle Aero Club, has been appointed chief pilot to the International Airways of Canada.

Scottish Notes

ON the 22nd inst. the Avro-Avian G-EBTY was flown from Edinburgh to Moorpark aerodrome, Renfrew, Glasgow, for use by the Scottish Flying Club. The machine was first owned by Mr. J. P. Drew, who was killed while flying a service machine in May last. It was acquired by an Edinburgh enthusiast, Mr. T. J. Connolly, B.L., who has for some time been pressing Edinburgh Town Council to lay down a municipal aerodrome. On the Air Ministry refusing facilities for Edinburgh-owned civilian aircraft, Mr. Connolly disposed of his machine to the Scottish Flying Club. Capt. Kingwill flew the machine to Renfrew. This is the first Avro-Avian owned by the Scottish Flying Club, their previous machines having all been D.H. Moths.

The Marquis of Douglas and Clydesdale, known as the "Flying Marquis," addressed the Rotarians on "Flying" in the North British Station Hotel, Edinburgh, on the 20th inst. Capt. Hanney, of the Cameron Highlanders, emphasised the need of enthusiasm in the Scottish capital.

Mr. W. J. Stoddart, of the Empire Exhibition, Edinburgh, thinks we should have an aero exhibition in Edinburgh in 1929 or 1930. This project has already been under discussion among Scottish enthusiasts, and has meantime been "turned down." So far as Edinburgh is concerned, there are two factors against its being the locale, viz., (1) the Waverley market is not nearly commodious enough, and (2) the only aerodrome in the district (Turnhouse) is closed against the civilian. In mid-August the Air Ministry refused to licence Turnhouse for use by civil aircraft, and this has given "air-mindedness" a set-back meantime. Edinburgh must remain out of the game until Turnhouse is thrown open to civil aircraft or the Town Council lay down a municipal aerodrome. Glasgow has Kelvin Hall and Moorpark aerodrome, and is thus the only venue meantime for a Scottish aero show.

PRIVATE FLYING

A Section of FLIGHT in the Interests of the Private Owner, Owner-Pilot, and Club Member

PRIVATE FLYING FOR BUSINESS PURPOSES

By CAPT. H. BALFOUR, M.C.

(This plea for the utility of the light aeroplane for business as well as pleasure is timely, and also appropriate, from our contributor, Capt. H. Balfour, M.C., General Manager of Messrs. Metal Propellers, Ltd., Croydon, for he experiences what he advocates. His D.H. "Moth X" (Cirrus Mark II) has the D.H. split axle and Handley-Page slots.—ED.)

WE hear much about those fortunate ones who have the time and facilities for foreign air touring, but it has occurred to me that many people have not yet realised the advantages and practicability of the light aeroplane as a substitute for a car on a business trip.

In the hopes that it may interest others, I give this short account of a tour just completed on my D.H. "Moth" for the purpose of visiting certain R.A.F. units and aircraft firms.

Capt. H. Balfour, M.C., with his D.H. "Moth X" (Cirrus Mk. II), which has the Handley-Page slotted wings. He is general manager of Metal Propellers, Ltd., of Purley Way, Croydon.

To have covered the ground by car would certainly have taken several long and tiring days at the wheel, instead of a flying time total of under seven hours.

My passenger, a business associate, who had only been up once, but who wanted the experience of a light aeroplane flight across country, and I watched the Autogiro leave for Paris from Croydon on Tuesday, September 18, then into our D.H. "Moth," and off at 10.30 a.m. Up to 2,000 ft. and above the misty clouds in bright sunshine until clear of Twickenham, when we came through to pick up our course north. Alas, the fog clouds were so low that I was flying about 200 ft. only above the house tops. Where the new Great West road joins the Bath road, there is a fine stubble field, and into this we descended to wait until the sun was strong enough to disperse the fog. Only about four men came up to the machine, and even the A.A. scout at his box a few hundred yards away did not turn a hair. All of which shows how air-minded the average citizen is becoming. After a glass of beer and a biscuit at the pub on the corner, we took off at 11.30 a.m. A glorious flight over the finest hunting country in England brought us to Hucknall by 1 p.m.—to be met with the kindness and hospitality of the Nottingham Club and Mr. Martin. Lunch at a local hostelry, petrol and oil, and into the air again about 2.45 p.m.

Inadequate maps, coupled with a long standing proclivity for losing myself, and a thick pea soup atmosphere combined to make a landing advisable, after flying due north for about 40 mins. We chose a football ground at the edge of a large town, which could be seen dimly, but smelt acutely, for visibility was nearly nil by then. As we landed, the houses behind disgorged hundreds upon hundreds of men, women and children of every size and shape. I saw that if they once got up to the machine we should never get off again, so I leapt out, collared the man who was first favourite in the race, and leading the field, and asked where we were. "Rotherham, lad," he replied in a broad north-country accent. I almost vaulted into the cock-pit and opened the throttle in one motion, and we were off before the pack got near their prey.

North again, till we judged ourselves to be near Sherburn, but air still thick, so down into a stubble field to find we were but five miles away. A few minutes more, and we were on the Yorkshire Club aerodrome, being well looked after by Capt. Beck, an old friend of R.F.C. days. Here I dropped my passenger, who had to return to London, and I took off for Catterick, which was reached after 45 mins'. flying in glorious sunshine and blue skies, down to Nottingham, a contrast to the weather south of Sherburn.

After the chief objective of my trip had been attained, I left Catterick at noon the next day and three-quarters of an hour later I was enjoying the hospitality of Major Bumpus and Capt. Blake of the Blackburn Aeroplane Co., Ltd., at the firm's splendid club on Brough aerodrome.

Off again at three o'clock and directly the River Humber was crossed, the haze belt was again run into, but this time it was not so bad as on the previous day.

Steering due south, the Wash was hit off by Boston, and following it round (but keeping well clear of an R.A.F. Horsley towing an aerial target), King's Lynn was passed over about an hour and five minutes after leaving Brough.

When steering a course for Norwich, a desire for tea became the leading feature, so down into a good-looking park in the hopes that the kind owner would supply the need—after the excuse of being lost was given as the reason for landing!! Alas, only a gardener came up, for Lady T. (the owner) was away. Off again, and in 20 mins. came Norwich, where the Norfolk club soon made me forget the tea thoughts. Some business done, petrol and oil taken in (as well as other supplies, by Tollemache!) and off to Martlesham, the Felix Hotel, and a certain tall Air Force friend, his charming wife and sister.

The next morning, a leisurely start at 11.30 a.m., and 45 mins. later I crossed the Thames by Hornchurch aerodrome, to meet once more the local pea-soup haze, which brought me down to 400 ft. and necessitated a detour round the outskirts of London towards Croydon. Two miles short of the aerodrome it cleared up, and the little D.H. "Moth" and I landed in brilliant sunshine. The engine, "Cirrus Mark II," never missed a beat, but ran as it always does and has done, consumed only about four and a-half gallons of petrol per hour, a negligible amount of oil, while the aeroplane was as comfortable and charming to fly as it always is.

WESTLAND "WIDGEON" ACTIVITIES

THE Westland "Widgeon" is finding a considerable market abroad. There is a batch shortly being shipped to Australia for the agents, Messrs. Brockway Motors, Ltd., of Sydney. One of them is to be used in the mining industry by a well-known mining company. The mine is situated far from the coast, and can only be reached by bearers, for rail or motor

transport is not possible. The consequent loss of time in transporting personnel to the mine was very serious, but the remedy will now be found in the Westland monoplane.

Another of these machines is going to Brisbane immediately for Messrs. Eager & Sons, of Brisbane, who are taking up the agency for them.

The Port Elizabeth Flying Club of South Africa, who have a Westland "Widgeon," have loaned it on two occasions this year to enable a surgeon to save life. Recently, a surgeon left Port Elizabeth at 8 a.m., reached East London in 1¼ hrs., the distance being 140 miles, performed the operation, and was back by shortly after 5 p.m. the same day.

Capt. Paget, the Westland Aircraft Co.'s chief test pilot, functioned as joy-riding pilot with the monoplane at the open-air fête held on August 18, in the spacious grounds of Cranmore Hall, the home of Sir Richard Paget.

Recently, a member of the Australian Aero Club, Mr. H. S. Notley, visited Yeovil, accompanied by his father, Capt. Sir Franke Notley. The former was very familiar with the "Widgeon," now in Sydney, and is a friend of Mr. Milton Kent, who piloted his own "Widgeon" to victory in the Queensland Aerial Derby.

Another interesting visitor to Yeovil lately was Count Kinsky, of Prague, who flew to England in his Junkers monoplane in order to play polo at Dunster. He expressed keen appreciation of Yeovil.

There were three Westland "Widgeons" competing in last King's Cup Race, and all successfully completed the course. Mr. R. G. Cazalet flew his own machine, and so did Mr. "Harold Brooklyn," whose interesting accounts of his tours have appeared in FLIGHT. Then Mr. R. A. Bruce's machine was flown by Col. The Master of Sempill.

In this picture are (left to right) Mr. B. J. Hanstock, of the Anglo-American Oil Co., Ltd., Mrs. St. J. Plevins, Mr. "Harold Brooklyn," D.S.O., and Lord and Lady Blyth. The occasion was the landing of Mr. "Brooklyn" in his Westland "Widgeon" in a field near the house of Mr. St. J. Plevins, of the Anglo-American Oil Co., Ltd., followed by luncheon with the latter.

LIGHT 'PLANE CLUBS

London Aeroplane Club, Stag Lane, Edgware. Sec., H. E. Perrin, 3, Clifford Street, London, W.1.

Bristol and Wessex Aeroplane Club, Filton, Gloucester, Secretary, Capt. C. F. G. Crawford, Filton Aerodrome, Patchway.

Cinque Ports Flying Club, Lympne, Hythe. Hon. Secretary, R. Dallas Brett, 114, High Street, Hythe, Kent.

Hampshire Aero Club, Hamble, Southampton. Secretary, H. J. Harrington, Hamble, Southampton.

Lancashire Aero Club, Woodford, Lancs. Secretary, F. W. Atherton, Woodford Aerodrome, Cheshire.

Liverpool and District Aero Club, Hooton, Cheshire. Hon. Secretary, W. F. Davison, 357, Royal Liver Building, Liverpool.

Midland Aero Club, Castle Bromwich, Birmingham. Secretary, Maj. Gilbert Dennison, 22, Villa Road, Handsworth, Birmingham.

Newcastle-on-Tyne Aero Club, Cramlington, Northumberland. Secretary, J. T. Dodds, Cramlington Aerodrome, Northumberland.

Norfolk and Norwich Aero Club, Mousehold, Norwich. Secretary, G. McEwen, The Aerodrome, Mousehold, Norwich.

Nottingham Aero Club, Hucknall, Nottingham. Hon. Secretary, Cecil R. Sands, A.C.A., Imperial Buildings, Victoria St., Nottingham.

The Scottish Flying Club, 101, St. Vincent Street, Glasgow. Secretary, Harry W. Smith.

Southern Aero Club, Shoreham Sussex. Secretary, C. A. Boucher, Shoreham Aerodrome, Sussex.

Suffolk Aeroplane Club, Ipswich. Secretary, Maj. P. L. Holmes, The Aerodrome, Hadleigh, Suffolk.

Yorkshire Aeroplane Club, Sherburn-in-Elmet, Yorks. Secretary, Lieut.-Col. Walker, The Aerodrome, Sherburn-in-Elmet.

LONDON AEROPLANE CLUB

REPORT for week ending September 23.—Flying time, 68 hrs. 45 mins. Dual instruction, 40 hrs. 25 mins. Solo flying, 28 hrs. 20 mins.

Dual instruction (with V. H. Baker): J. W. Radbone, D. I. Peacock, Miss Fletcher, A. J. Richardson, B. S. Whidborne, G. R. C. Charles, Miss Hicks, H. R. Presland, A. O. Wigzell, Miss C. Johnson, J. A. G. Haslam, E. L. Gosling, Dr. Cook, G. F. Roberts. With F. R. Matthews: Lieut.-Col. A. J. Farfan, S. Hansel, A. O. Wigzell, F. V. Fairbairn, E. L. Gosling, Miss H. Cholmondeley, C. J. Pool, N. L. Sherlock, E. D. Moss, Capt. The Master of Gray, W. W. Briscoe, D. I. Peacock, B. L. Middleton, T. H. O. Richardson, L. R. Gaywood.

Solo flying: H. C. Bergel, E. T. Symmons, C. Campbell, P. W. Hoare, E. Hosley, H. Sutton, Capt. Roche Kelly, J. J. Hofer, J. A. G. Haslam, D. P. H. Esler, W. Hart, Miss Hicks, W. L. M. O'Connor, J. W. P. Chalmers, E. D. Moss, D. I. Peacock, T. Elder Hearne, P. A. Wills, G. R. S. Charles, Miss Fletcher, Major K. M. Beaumont, D.S.O., M. L. Bramson, G. H. Craig, Capt. A. G. Lamplugh, A. R. Ogston, E. E. Stammers, A. F. Wallace, R. Ward, E. A. Lingard.

Passenger flights: Miss Sherlock, Mrs. Moss, J. MacLaren, Mrs. Skinner, M. F. Perry, C. P. Campbell.

H. Sutton and W. Hart completed the tests for their aviators' certificates.

Miss Hicks made her first solo flight on September 19.

Club aircraft: Saturday was a busy day as regards club aircraft. We took delivery of a new D.H. Moth Cirrus Mark II G-AABL, to replace G-EBYD, which was crashed on August 3 last.

Major Clark, the Pilot Instructor of the Cinque Ports Flying Club, arrived at Stag Lane with a cheque in his pocket to purchase one of the Club's D.H. Moth "Cirrus" Mark I. The transaction was completed in a few minutes, and he left immediately with G-EBNN for Lympne.

Shortly afterwards, the club heard that a D.H. Moth "Cirrus" Mark II, fitted with slots, was for sale. It was tested by Mr. Matthews and Captain A. G. Lamplugh, and the purchase completed the same afternoon. The London Aeroplane Club has now five D.H. Moths (two Mark II and three Mark I). They are prepared to consider offers for the Mark I Moths.

Record flying month: September has so far proved a record month for the club. The previous best month since the club was formed was May, 1927, 235 hours. The total so far this month is 244 hours, and nine members have obtained their "A" licences. The Club Instructors, V. H. Baker and F. R. Matthews, have been ably supported by the Ground staff, C. Humphreys and G. Gibbins, in achieving this record result.

Shed accommodation: The new hangar for the accommodation of the club aircraft is now in course of erection, and will be ready in a few weeks.

F. R. Matthews—wedding present. Mr. Matthews has been presented with a cheque for £28 11s., representing the sum kindly subscribed by the members.

BRISTOL & WESSEX AEROPLANE CLUB, LTD.

REPORT for week ending September 22.—Total flying hours: 23 hrs. 50 mins. Dual instruction, 13 hrs. 45 mins. Solo flying, 6 hrs.

Instruction with Mr. Bartlett: Miss Miles, Messrs. Davis, Dutton, D. B. Singh, Heaven, R. S. W. Clarke, Tinson, Harris, Amory, Byrnes and C. Pitman. With Mr. Tratman: Mr. Davis. With Mr. Culverwell: Messrs. Davis and D. B. Singh.

The temporary absence of two machines has kept down the total flying hours, and competition for the use of G-EBYH has been fierce.

Mr R. S. W. Clarke is to be congratulated on his first solo flight, and Mr. D. H. Amory on passing successfully the "A" licence tests.

CINQUE PORTS FLYING CLUB

REPORT for week ending September 22.—No flying took place during the week owing to the machine S.S. having to go back to the works for the results of Mr. West's landing to be rectified.

The club has begun to reap the fruits of its labour from the Government, and advantage has been taken of this to purchase another de Havilland Moth machine for use of the members. This will obviate most of the tiresome delays due to minor accidents and necessary repairs which have held up flying during the summer. The machine is a Mark I Cirrus Moth N.N. and was delivered to Lympne on Saturday evening. We hope to have our old machine S.S. back from the works on Wednesday, and thereafter the two machines will carry on together and the hangar will house machines Nos. S.S., N.N. and Z.Z. The latter machine belongs to one of our members, Capt. Rattray, who very kindly let the club use it for a bombing expedition against a motor-cycle and side-car at the Kent Motor Club's Grass Speedway Meeting on Wednesday, the 19th instant. Capt. Rattray was not successful in hitting the side-car though he nearly demolished one of the officials, and a bomb burst prematurely in the cockpit so that Capt. Rattray landed looking like a snow storm.

It has been decided to make special rates for members joining the club during the winter months, taking effect as from October 1, and persons desirous of taking advantage of this may obtain full particulars from the hon. secretary, 114, High Street, Hythe, Kent.

We note with acclamation the twittering of our feathered friends from the canaries anent our new scheme of decoration. This was carried out by Mr. Drage, under licence from our old friend MacFisher. We find the free insurance policy *so* useful. As a compliment to Mr. Drage our next machine will be an exact replica of one of his justly celebrated plain vans.

HAMPSHIRE AEROPLANE CLUB

REPORT for week ending September 21.—Total flying time, 37 hrs. 55 mins. Dual instruction, 18 hrs. 20 mins.; "A" pilots, 10 hrs. 35 mins.; solo, 3 hrs. 35 mins.; passenger flights, 4 hrs. 55 mins.; instructors' solo and tests, 30 mins.

Instruction: (With Flight-Lieut. Swoffer and Mr. W. H. Dudley).—Messrs Reuther, Mariner, Beagley, Tobutt, Crook, Hall, Buckley, Brodrick, Evershed, Richardson, Mattocks, Weekes, Miss Home, Mrs. Gordon Smith, Commander Bell, Maj. Thorn, Lieut. Des Graz, Mrs. Crook, Lieut. Roskill, Lieut. Oswald, Miss Melvill, Miss Grace, Lieut. Coode.

"A" Pilots.—Messrs. Scott-Hall, Wells, Parker, Michelmore, Curtis-Nuthall, Sanders-Clark, Jopp, Rayson, Flying Officer Hayter, Capt. Kirby, Lieut. Heinemann, Lieut. Heath, Miss Grace, Lieut. Du Cane.

Soloists.—Messrs. Hall, Whittle, Commander Bell, Commander Tower, Flight Officer Holmes, Flying Officer Hughes.

Passengers.—Messrs. Lloyd, Woodhouse, Downey, Marshall, Lyron, Slaughter, Waite, Peacock, Privett, Trent, Miss Le Lubez, Mrs. West, Mrs. Caddy, Miss Auley, Miss Woodhouse, Miss Hodgkinson, Miss Scott, Miss Clawbers, Mrs. Crook, Miss Youell, Miss Privett, Miss Keable, Mrs. Thorn, Mrs. Trent, Miss Marriott.

We have been greatly handicapped this week owing to lack of aircraft, and have been struggling along with one Moth. Misfortunes never come singly. On Wednesday a soloist tried to land on one of the few rough spots on the aerodrome and the machine went on to its nose. Another prop gone, but fortunately little other damage. In consequence we had no machine at all for 12 hrs.

We understand that the chief instructor enjoys replying to some of the less imaginative of our members who insist on asking him "*Why* have we only one aeroplane?"

ISLE OF PURBECK LIGHT AEROPLANE CLUB

REPORT for week ending September 22.—Total flying time, 8 hrs. 30 mins. Club work this week has been much restricted, owing to the Spartan having been lent to the N.F.U., and her spare time being more than occupied by inquisitive people bent on "rumbling." A series of 30 mins. with the Portman Hunt round Manston, a burning scent, with big doubles and heavy going on the take-off and landing sides, nervous thrusters and cursing Master, leaves one with a good impression of the Spartan's recent work.

Needless to say, she came through sound in wind and limb and must be cast iron.

Verily, she is a "good one to follow and a bad one to beat."

LANCASHIRE AERO CLUB

REPORT for week ending September 22.—Flying time, 36 hrs. 35 mins. Instruction, 11 hrs. 35 mins.; solo flights, 12 hrs. 30 mins.; passenger flights, 9 hrs., 10 mins.; tests, 2 hrs. 40 mins.

Instruction: (With Flight Lieut. Todd).—Eckersley, Ashworth, J. H. Taylor, S. Nuttall, Goss, Miss Emery, Kay, Butt, Miss Swithenbanks, Allott, Brooking, Miss Baerlein, Agar, Foote, Greg, Davies, R. G. Barlow, Whitehouse, Faulkner, Dane, Riley, Hepworth. (With Mr. Cantrill).—Kay, Miss Baerlein. (With Mr. Scholes).—Ashworth, J. H.

Soloists (under instruction).—Faulkner, Ashworth, W. Eckersley, Kay, Allott.

Pilots.—Cohen, Michelson, Caldecott, Miss Baerlein, Mills, Ruddy, Lacayo, Nelson, D., Brooking, Leeming, Twemlow, Hall, Riley, Agar.

Passengers: (With Mr. Cantrill).—Wedd, Dabbs, Collins. (With Mr. Twemlow).—Pole. (With Mr. Rowley).—King. (With Mr. Lacayo).—Goss, Miss Faulkner, Allott. (With Mr. Scholes).—Mrs. Hilton. (With Mr. Caldecott).—Riley, Greg, Lindo. (With Mr. Todd).—Eatough. (With Mr. Hall) Mrs. Hilton, Miss Baerlein, Palmer, Provis, Allott, Faulkner, Mrs. Ashworth, Miss Lamb, Taylor, S.

Messrs. Eckersley and Kay made successful first solo flights.

LIVERPOOL & DISTRICT AERO CLUB

REPORT for week ending September 22.—Total time flown, 29 hrs. 20 mins. Dual instruction, 16 hrs. 50 mins. Solo and joyrides, 12 hrs. 30 mins.

Dual (with Mr. Allen):—Mrs. Eills, Miss Evans, Miss Hughes, Messrs. Moulsdale, Henderson, Eills, Andrews, Alcock, Edgar, Goodman, Sparke, Maistrand, Reville, Cowan, Barber, Foley, Mines, Curwell, E. H. Williamson, Chatterley, Willcox, Barnes, McGeagh, Rev. Woosnam Jones.

Solo: Messrs. Benson, Henderson, Willcox, Moulsdale, Sparke, Francis, Ward, Leete, Barber, Brooking, McClure, Pixton.

Joyrides (with Mr. Allen):—Mr. Hipwood: (with Mr. Davison): Messrs. Wilson, McGeagh, Miss Read; (with Mr. Ward): Miss Noonan, Miss Keenan, Mr. Alcock.

Cross Country: Mr. Crosthwaite and Miss Colwell to Woodford (Lancs. Club), and return.

Mr. and Mrs. "Dick" Bentley returned to Stag Lane on Monday morning, leaving at the murky hour of 6 a.m.

Messrs. Hall and Faulkner, of the Lancashire Club, visited us on the 19th in Avro RR, and Mr. Lacayo and passenger on the 20th in the same machine.

Mr. Bunning landed his Renault Avro on Friday, owing to bad visibility, en route Prestatyn to Sale.

Things we want to know. Who is the "A" pilot who flies without a helmet, and is this to prevent his fair passengers answering him back? If so, what does he say to them, and is it worth sixpence a minute?

MIDLAND AERO CLUB

REPORT for week ending September 22.—Total flying time 44 hrs. 28 min.; dual, 21 hrs. 35 mins.; solo, 19 hrs. 40 mins.; passenger, 2 hrs. 45 min.,; test, 28 mins.

Dual instruction with Flt.-Lt. T. Rose, D.F.C., and Mr. W. H. Sutcliffe was given to the following members:—M. Blakeway, O. L. Richards, F. D. Scott, J. A. V. Cook, R. G. Welch, C. T. Davis, T. W. Wild, G. P. Haylock, D. N. Khatri, J. K. Morton, W. J. Halland, F. J. Steward, T. H. Drury, J. Fitzgerald, H. Coleman, N. C. Wilks, P. M. Patel, J. A. Ridsdale, A. E. Coltman, Mrs. Leigh Fermor, Dr. W. G. Tilleke, Major D. Thompson.

"A" Licence Pilots:—E. P. Lane, Dr. N. J. Nock, S. Duckitt, G. Robson, G. C. Jones, R. C. Baxter, R. D. Bednell, S. H. Smith, H. J. Lattey, W. M. Morris, E. R. King, M. A. Murtagh, J. Rowley, R. L. Jackson, W. Swann.

Soloists under training:—R. G. Welch, J. A. V. Cook, F. J. Steward, E. L. Hulme, T. H. Drury, H. Coleman, J. W. Astley, J. K. Morton, D. N. Khatri.

Passengers:—R. C. Flanagan, Mrs. Mendez, N. C. Harrison, Dr. Johnson, J. W. Astley, J. P. Rochford, H. M. Goodwin, M. Turner.

Messrs. H. Coleman, J. K. Morton and D. N. Khatri successfully made first solos.

Flt.-Lt. T. Rose collected L.T. from de Havillands on Tuesday, after its third annual overhaul. L.T. has been in continuous service on school work since September, 1925, without any untoward happening, and now has 833 hrs. flying to its credit.

The club will be represented at the opening of the Northampton Club on Saturday next by EBXT.

NORFOLK & NORWICH AERO CLUB

REPORT for week ending September 23.—Total flying time, 45 hrs. 20 mins.

Instruction (with Mr. Young):—Messrs W. S. Coates, L. C. Morter, A. A. Rice, C. Bethell, C. Lowen, C. Girling, H. J. Justin, C. Brown, R. Harvey, Mrs. Cator.

Soloists:—Messrs. D. Corsellis, E. Varden Smith, A. A. Rice, E. Lambert, G. Wharton, Sqdn.-Ldr. C. A. Rea, A. G. Marshall, F Gough, W. P. Cubitt, H. Pank, C. Bethell, H. J. Cator, H. Neave, N. Brett, T. Image, C. Lincoln Sutton, R. Harmer, C. Land, W. A. Ramsay, H. Harvey. Passengers, 63.

Congratulations to Mr. C. Bethell and Mr. C. Land on their first solos this week with good landings, and also to Mr. H. Neave for the height test he carried out successfully.

Mrs. Cator flew up to Yorkshire on Monday to visit her home town. She was accompanied by the instructor, as this was her first long cross-country flight, and had a great reception. The whole population appeared on the scene to greet her.

We hope to send three machines up to Northampton on Saturday next if they are not broken in the meantime.

NOTTINGHAM AERO CLUB

REPORT for week ending September 21.—Flying time, 20 hrs. 40 mins. Instruction, 4 hrs. "A" pilots, 7 hrs. Solo (under instruction), 7 hrs. 40 mins. Passengers, 1 hr. 10 mins. Tests, 50 mins.

Instruction (with Mr. Martin): Messrs. A. A. Austin, J. S. Austin, Hutchinson, Kay, Warren, Cudlip, Hancock, Granger, Thorpe.

Solo, "A" Licence: Messrs. Bradly, Wynn, Taylor, Selvey, Granger, Pilgrim, Austin.

Solo (under instruction): Messrs. J. Austin, Hancock, Winn, Glinn, Shipside, Chawla.

Passengers: Miss Loney, Miss Bostock, Miss Lambert, Messrs. Marshall, Cudlip, Rennardson.

Morning and evening fog has curtailed a large number of members from flying, but with only one machine in action, we cannot grumble. At the time of writing our engine for QW has arrived, so we are commencing this week with two kites—at last. We have to take our hats off to Mr. Glenn on passing his R.A.C. tests O.K. His height test showed a perfect "cupopola." Mr. J. S. Austin (Texas) would have completed his test, but failing light forced him to the ground "three-point wise." It is hard luck, as he has a long way to come, and very few times in which to come.

The Skywriting "'erbs" are still with us, trying to monopolise our one and only stove (delivered by plain van), and owing to our very successful onslaughts both inside and outside the aerodrome, they have called for reinforcements in the shape of Sydney St. Barbe, with kite. We can cope with the whole personnel.

SUFFOLK & EASTERN COUNTIES AEROPLANE CLUB

REPORT for week ending September 15.—Flying time, 29 hrs. 10 min. Instruction, 7 hrs. 50 min. "A and B" pilots, 7 hrs. 45 min. Solo, under instruction, 6 hrs. 35 mins. Passenger flights, 6 hrs. 25 mins. Tests, 35 mins.

Week ending September 22.—Flying time, 17 hrs. 30 min. Instruction, 10 hrs. 30 min. "A and B" pilots, 2 hrs. 5 min. Solo, under instruction, 3 hrs. 10 min. Passenger flights, 55 min. Tests, 50 min.

Instruction (with Mr. Lowdell):—Dr. Mildred Yate, Mrs. Young, Messrs. Welsh, Ogilvie, Wedd, Croydon, B. F. and T. Marriage, Hanson, Billinton, Collins, and Dr. Dunn.

Solo (under instruction):—Messrs. Ogilvie, Hanson, and Jelly.

"A and B" Pilots:—Dr. Sleigh, Flying Officer Birt, Messrs. Prentice and Brown.

Owing to the display, no report was sent in last week, therefore two weeks are now included in one report.

We congratulate The Cinque Ports and the Norwich Clubs on being first and second in the "On to Hadleigh," and also thank them and others for their valued support at the Display.

Mr. Glen Ogilvie passed his tests for "A" Licence. He spent his summer holidays from Rugby with us, and made very good progress as an *ab initio* pupil. He has now returned to school, and at the end of this term will, we believe, take up an appointment in the aircraft industry. We hope that other Public School boys will follow his example. We are all out to do all that is within our power to help them.

YORKSHIRE AEROPLANE CLUB

REPORT for week ending September 22.—Flying time, 20 hrs. 35 mins. Dual, 6 hrs. 50 mins. Solo, 13 hrs. 25 mins. Passengers, 20 mins.

Instruction (with Capt. Beck):—Miss Ellison, Messrs. Bamford, Brackenbury, Dujardin, Gaunt, Little, Palmer.

Soloists:—Messrs. Dujardin, Fitton, Little, Senior.

"A" Pilots:—Messrs. Ambler, Birch, Clayton, H. Crowther, Dawson, Ellison, Lister, Mann, Thomson, Wood.

Passengers:—2.

A very fine first solo effort was put up by Mr. Dujardin, who has shown great perseverance, and perhaps greater keenness in carrying on, despite innumerable difficulties.

We were visited during the week by Lieut. Bentley, who was on his way to Scotland and called in his Moth "Dorys," which is the machine whereon he did his world-famed flight.

We have now been awaiting spares for our third machine for a matter of some weeks. This aeroplane has been in perfect readiness for the engine when spares came to hand. We still live in hope!

FLIGHT
AIRCRAFT ENGINEER AIRSHIPS

AIRISMS FROM THE FOUR WINDS

Amsterdam-Batavia Air Mail

LIEUT. G. A. KOPPEN, who left Amsterdam on September 13 at 6 a.m. for Batavia in a Fokker VII-3m. (3-Armstrong-Siddeley "Lynx") with mail, reached his destination on September 25, thus covering the 8,750 miles in 12 days. His progress may be summarised as follows :—September 13—Amsterdam—Nuremburg—Vienna. September 14—Vienna Budapest—Sofia (7 hrs.). September 15—Sofia—Constantinople—Aleppo. September 16—Aleppo—Baghdad. September 17—Baghdad—Bushire—Bandar Abbas. September 18—Bandar Abbas—Karachi. September 19—Karachi—Allahabad (9 hrs.). September 20-September 21 (no reports). September 22—Arrived Sengora. September 23—Arrived Medan. September 25—Arrived Batavia at 10.48 a.m., later reaching Bandoeng. Once again, therefore, have the British Armstrong Siddeley "Lynx" engines achieved a splendid success. The second of the batch of Fokker-"Lynx" monoplanes, which are flying to Batavia at weekly intervals, arrived at Karachi on September 25.

Berlin-Tokio Flight

BARON VON HUENFELD, the German airman who crossed the Atlantic with Capt. Koehl and Col. Fitzmaurice, and is now attempting a flight from Berlin to Tokio, was detained on arriving at Bushire on September 21 by the Persian authorities, who were not apparently satisfied with his credentials. He was, however, allowed to proceed later, and arrived at Karachi on September 25 after an all-night flight down the Persian Gulf. He left Berlin on September 18 in a Junkers "Europa" monoplane.

Lady Bailey Flying to England

THE Sudan authorities refused Lady Bailey permission to fly unescorted over the desert, so she decided to take the West Coast route. Starting from Pretoria on September 21, she reached Bulawayo in her D.H. "Moth" and landed the next day, September 22, at Salisbury. On September 24, Elizabethville, in the Katanga Province of the Belgian Congo, was her stopping place.

London-South Africa

CAPT. S. HALSE and his wife, who left London on September 10 for a flight to Queenstown, S. Africa, in their "Gipsy-Moth," reached Heliopolis on September 24.

Canadian Airmen's Adventure

SQUADRON-LEADER A. E. GODFREY, of the Royal Canadian Air Force, flew alone recently across the Continent from Ottawa to Vancouver. He started the return flight with three companions and was missing after September 16, when he left Peace River town for Fort Smith. They were found after several days by Brigadier-General A. E. McRae. The seaplane had fallen into Peace River and became totally wrecked, but the crew were saved, although Sqdr.-Ldr. Godfrey had a fractured leg. The cause of the accident was the dense smoke arising from forest fires. When the seaplane touched the water Godfrey opened the cabin door and thus allowed the escape of the crew, who swam thirty yards to the shore.

All in the Wing

IT is reported that the Junkers Company of Germany are constructing at Dessau a new monoplane J.38, in which engines and passengers will be situated in the wing. The suggested power is four 800-1,000 h.p. engines.

Autogiro Mishap in Paris

SENOR DE LA CIERVA met with a slight mishap with his Autogiro (Lynx) at Le Bourget on September 20, without injury to himself or passenger. He had recently flown the Channel with his machine for the first time.

Wilkins Antarctic Expedition Sails

SIR HUBERT WILKINS, the Arctic airman, sailed from New York for Montevideo on September 22 on the first stage of the voyage to Deception Island, which is to be the base for his Antarctic expedition. His companions were Lieut. Carl Eielson, the pilot on his previous North Pole flight, Mr. J. Crossan, a relief pilot, and two mechanics. Two Lockheed "Vega" aeroplanes are to be used. It is announced that Sir Hubert Wilkins has become engaged to Miss Suzanne Bennett, an Australian actress.

Cape Town-Pretoria Record

COL. SIR PIERRE VAN RYNEVELD, Director of the South African Air Force, made a record non-stop flight from Cape Town to Pretoria on September 21 in 7 hrs. 20 mins. in a Bristol (Bristol "Jupiter") machine. He recently covered the 1,000 miles' journey in the opposite way in 7 hrs. 27 mins.

Mexican Record

A NEW long-distance air record for Mexico was made recently when a machine specially chartered by an American business man and his wife flew from Vera Cruz to Merida, a distance of 850 miles, making a stop overnight at Minatitlan. The previous record between Mexican cities was a flight of 720 miles.

Nearly Four Miles By Parachute

ASCENDING from Paris in an aeroplane to 18,000 ft., Capt. Willy Coppens (the popular Belgian Air Attaché), on September 25, returned to earth by means of a parachute. He made a successful landing, and has thus, we believe, established a record parachute descent.

French Ban on Record Breaking

THE French Air Minister, M. Laurent Eynac, has decided to ban all French attempts at records until further orders, on the plea that they mean little advantage to aviation even if successful. He has threatened to resign because the War and Commerce Ministries refuse to surrender any power possessed over their respective air forces. It is possible that they may retain power over personnel and M. Eynac over material.

New Packard Engine

IT is stated that successful flights have been carried out with a new radial air-cooled engine of 220 h.p. manufactured by the Packard Company. Apparently crude oil is used for fuel, doing away with a petrol ignition system. Tests were made at Detroit.

American Honours for French Airmen

LIEUT. LE BRIX, who accompanied Capt. Costes on a S. Atlantic flight and world's flight, was decorated with the American Distinguished Flying Cross at the United States Embassy on September 20. A similar award has already been made to Capt. Costes.

Atlantic Air Mail to Resume

THE air mail experiments with the French liner *Ile-de-France* will be continued on the next voyage from Le Havre to New York, which is scheduled for October 10. The amphibian is catapulted from the liner before it reaches each destination. Recently the machine made a forced landing off the Scilly Isles and was adrift for ten hours before being salved with the crew safe.

Zeppelin Trials Successful

THE new German Zeppelin made another and longer successful trial flight on September 20 with 38 passengers on board and full crew of 39. It flew 650 miles over Germany and Switzerland.

A Spanish Balloon Accident

MAJOR MOLA, of the Spanish Royal Flying Corps, was killed on September 16, when a balloon in which he was attempting to beat the height record fell in flames in the Province of Murcia. The balloon was the one in which he had taken part in the Gordon Bennett Cup contest.

Actors' Tour by Air

MR. E. STIRLING and his English Players Company flew from Paris to Geneva in an Imperial Airways machine, specially chartered, on September 15. After their performances at several places they will return by air to Paris.

R.A.F. Band Home

AFTER playing to about 3,000,000 people (not all at once, of course !) in Canada, the Royal Air Force Band returned home on September 19.

THE ROYAL AIR FORCE

London Gazette, September 18, 1928

General Duties Branch

The following are granted permanent commissions in the rank of Pilot Officer, with effect from Sept. 10, and with seniority of Sept. 10, 1927 :—J. F. X. McKenna, E. M. Thomas, R. S. Collins, P. Kinsey, P. G. Thomson, L. Currie, M. V. Delap.

The following Flying Officers are granted permanent commissions Sept. 1) :—R. R. Bennett, J. M. Cohu, A. C. Evans-Evans (Sec. Lieut. Northants Regt. T.A.), G. D. Green, A. W. B. McDonald, A. E. Paish, H. M. G. Parker, G. B. M. Rhind, G. J. Southam, W. A. Tattersall, H. M. S. Wright.

The following Pilot Officers are promoted to the rank of Flying Officer :—R. F. Gandy : July 4. A. R. S. Davies ; July 4. H. A. G. Comerford ; Aug. 30. B. M. Cary ; Sept. 11.

Flying Officer S. T. Clemens is placed on the retired list on account of ill-health ; Sept. 12. Flight-Lieut. G. M. Moore, M.C., is placed on the retired list at his own request ; Sept. 19.

The follg. Flying Officers are transferred to the Reserve :—

Class A.—L. H. Ross ; Sept. 12. C. G. M. Anderson, D. C. Burnley, K. Maconochie, C. N. A. B. Mumby, S. M. Thomas ; Sept. 15.

Class B.—S. G. Newport ; Sept. 12. W. W. Whitehead ; Sept. 16.

Medical Branch

Flight-Lieut. J. Hutchieson, M.B., is granted a permanent commission in this rank ; Sept. 12 (substituted for the notification in the *Gazette* of Sept. 11).

Chaplains' Branch

The Rev. R. H. Horton is granted a short service commission as a chaplain with the relative rank of Squadron Leader ; Sept. 13.

Memorandum

Flying Officer J. H. Truscott is granted permission to retain the rank of Flight-Lieut. on retirement from the Army ; June 23, 1926.

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The follg. are granted commissions in Class AA (ii) as Pilot Officers on probation ; Sept. 3 :—R. M. Clarkson, D. H. Duder, R. F. G. Lea.

The follg. Pilot Officers are promoted to the rank of Flying Officer :—J. M. H. Hoare, J. D. Williamson ; Sept. 4. B. B. F. Russell ; Sept. 17.

The follg. are confirmed in rank :—*Flying Officers on Probation.*—R. P. D. Brailli, G. M. Cox, M.C., C. T. E. Smith ; Sept. 6.

Pilot Officers on Probation.—H. O'B. Howat, H. R. Turner ; Sept. 5. T. R. Morrison ; Sept. 6.

Flight-Lieut. S. H. Gaskell is transferred from Class A to Class C ; Aug. 11.

The follg. resign their commissions on appointment to permanent commissions ; Sept. 10 :—

Class AA (ii).—Flying Officer J. F. X. McKenna, Pilot Officer P. G. Thomson, Pilot Officer P. Kinsey, Pilot Officer L. Currie.

Special Reserve.—Pilot Officer M. V. Delap.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Group Captain.—A. D. Warrington-Morris, C.M.G., O.B.E., to R.A.F. Depot, Uxbridge, Supernumerary, 17.9.28.

Wing Commanders.—J. N. Fletcher, A.F.C., to Home Aircraft Depot, Henlow, for Administrative duties, 27.8.28. E. R. C. Nanson, D.S.C., A.F.C., to R.A.F. Base, Calshot, pending taking over command, 1.9.28. J. H. S. Tyssen, M.C., to H.M.S. *Argus*, for duty as Senior Air Force Officer, 8.10.28. R. J. Mounsey, O.B.E., to R.A.F. Reception Depot, West Drayton, to command, 6.9.28.

Squadron Leaders.—W. Thomas, M.C., to No. 1 Stores Depot, Kidbrooke, 15.9.28. D. O. Mulholland, A.F.C., to No. 16 Squadron, Old Sarum, 25.9.28. R. M. Bayley, D.F.C., to R.A.F. Base, Calshot, 24.9.28. E. J. P. Burling, D.S.C., D.F.C., to Marine Aircraft Experimental Establishment, Felixstowe, 20.8.28. W. R. D. Acland, D.F.C., A.F.C., to Air Ministry (*D.O.I.*), 24.9.28. M. Thomas, D.F.C., A.F.C., to R.A.F. Cadet College, Cranwell, 1.9.28.

Flight Lieutenants.—W. B. Everton to H.M.S. *Eagle*, 1.9.28. G. Y. Tyrrell, M.C., F. R. Wynne, M.B.E., J. Silvester, to School of Photography, South Farnborough, 8.9.28. L. W. Jarvis, to R.A.F. Depot, Uxbridge, 17.9.28. L. G. Le B. Croke, to R.A.F. Base, Calshot, 17.9.28. E. S. Moulton-Barrett, to R.A.F. Base, Calshot, 17.9.28. T. H. Newton, D.S.C., to No. 2 Flying Training School, Digby, 14.9.28. F. E. Bond, to No. 41 Squadron, Northolt, 17.9.28.

Flying Officers.—H. A. Evans-Evans, to Electrical and Wireless School, Flowerdown, 27.8.28. C. W. Martin, to Home Aircraft Depot, Henlow, 11.9.28. M. Brunton, to No. 10 Squadron, Upper Heyford, 30.9.28. F. W. Field, to No. 7 Squadron, Worthy Down, 10.9.28. C. W. Dicken, to No. 101 Squadron, Bircham Newton, 12.9.28.

Pilot Officers.—C. R. Chameroy to R.A.F. Depot, Uxbridge, 27.8.28. W. S. C. Adams, R. A. Beynon, E. J. Brighton, D. A. Craik, E. B. Grace, G. D. Hoyland, R. Jones, G. S. King, J. Lewis, S. S. MacKay, G. R. Montgomery, M. G. Parker, S. P. Richards, to No. 1 Flying Training School, Netheravon, 8.9.28. J. F. X. McKenna, E. M. Thomas, R. S. Collins, P. Kinsey, P. G. Thomson, L. Currie, M. V. Delap, to No. 1 Flying Training School, Netheravon, on appointment to Permanent Commissions, 10.9.28.

Stores Branch

Flight Lieutenant.—E. V. E. Andrewartha to R.A.F. Station, Northolt, 15.9.28.

Accountant Branch

Flying Officer.—S. C. Wyatt, to No. 503 Squadron, Waddington, 20.9.28.

Pilot Officer.—R. Trippett, to No. 4 Squadron, South Farnborough, 7.9.28.

Chaplains' Branch

Rev. R. H. Horton, to School of Technical Training (Men), Manston, on appointment to a Short Service Commission, 13.9.28.

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28 Squadron (R.A.F.) Old Boys' Association Reunion

THE annual reunion supper of the 28 Squadron (R.A.F.) Old Boys' Association will be held on October 13 next, at the "White Horse," Holborn (near Holborn Tube station). Tickets, 3*s.* 6*d.* each. Assembling 6 p.m. for 6.30 p.m. The committee are anxious that this reunion—the ninth !—will be even more successful than the previous ones, and hope to get in touch with a few more Old Boys who have not yet "joined up." These may be certain of a warm welcome, which will be extended to their friends (gentlemen only !) also, as before. By holding the supper on the first Saturday in October, members in the provinces will have the opportunity of taking advantage of the excursions, etc., which are run during the Motor Show. Will those who wish to go please apply as soon as possible to the Hon. Secretary, G. T. Hodges, 102, Camden Street, London, N.W.1, stating how many tickets are required.

Aerodrome at Isleworth

THE Heston and Isleworth District Council has approved plans for the construction of a new aerodrome of 170 acres at North Hyde, close to the Grand Junction Canal.

Brighton Aerodrome

THE projected new aerodrome near Brighton may possibly be ready in a few months' time according to one report. It will be in the north-west corner of the motor track on the Downs at the back of Portslade, and 1,000 yards by 700 yards in size.

Bristol Activities on the Continent

OWING to the wide business connections which the Bristol Aeroplane Co., Ltd., have upon the Continent, they have now opened an office at 45, Boulevard Gouvion St. Cyr, Paris, under the charge of Capt. K. J. G. Bartlett, where full information can be obtained by Continental enquirers regarding Bristol activities.

All at Brough

IT is reported that the Blackburn Aeroplane Co., Ltd., intend to transfer their large Leeds works to their aerodrome and construction shops at Brough, East Yorkshire. The removal will be gradual, and probably completed by next spring.

AERONAUTICAL PATENT SPECIFICATIONS

(*Abbreviations* : Cyl. = cylinder ; i.c. = internal combustion ; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

APPLIED FOR IN 1927

Published September 27, 1928

14,220. E. LANZEROTTI-SPINA. Construction of crank-casings of i.c. engines. (286,337.)

14,737. M. LOBELLE. Liquid-cooling systems for use on aircraft. (296,472.)

25,780. S. E. SAUNDERS. Flying-boats. (296,570.)

30,094. S. E. SAUNDERS. Seaplanes. (296,594.)

APPLIED FOR IN 1928

Published September 27, 1928

13,079. HOWALDTSWERKE AKT.-GES. Floating docks for water aircraft. (289,840.)

13,646. HOWALDTSWERKE AKT.-GES. Floating docks for water aircraft. (290,655.)

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